Puget Sound Energy

2015

Service Quality and Electric Service Reliability Report

Filed on March 29, 2016

TABLE OF CONTENTS

APPENDICES

CHAPTER 1

INTRODUCTION

Executive Summary

As Washington State's oldest and largest energy utility, with a 6,000-square-mile service territory stretching across 10 counties, Puget Sound Energy (PSE) serves approximately 1.1 million electric customers and over 800,000 natural gas customers primarily in the Puget Sound region of Western Washington. PSE meets the energy needs of its customer base through cost-effective energy efficiency measures, procurement of sustainable energy resources and far-sighted investment in the energy-delivery infrastructure. PSE employees are dedicated to providing quality customer service and to delivering energy that is safe, dependable, efficient and environmentally responsible.

The report provides PSE's 2015 performance for the following areas: Customer Service Guarantee, Restoration Service Guarantee, service quality performance of PSE and its service providers, and electric service reliability performance.

For the 2015 Service Quality Program year, PSE met its benchmarks for following indices: WUTC Complaint Ratio (SQI[1] #2), System Average Interruption Frequency Index (SQI #4), Customer Access Center Transactions and Field Service Operations Transactions Customer Satisfaction (SQI #6 and #8), Gas and Electric Safety Response Time (SQI #7 and #11), and Kept Appointments (SQI #10).

PSE did not meet the benchmark for Customer Access Center Answering Performance (SQI #5). Several factors contributed to the missed live-call target, incurring a $360,000 penalty. A changed bill-collection process led to increased calls and lengthier call times, and inadvertently coincided when we were in the process of hiring and training new agents not yet ready to take calls. Also, failures on our technology systems that support our online and self-serve outage reporting and information tools during last August's widespread power outage drove customers to call us and experience longer-than-usual wait times. Chapter 2: Customer services and satisfaction and operations services, SQI #5 section details the drivers of the 2015 performance and PSE's plan to improve its performance going forward.

PSE did not meet the benchmark for System Average Interruption Duration Index (SQI #3) as calculated because of the two extraordinary weather events that occurred in August and November of 2015. PSE is

[1] Service Quality Index

petitioning with the Washington Utilities and Transportation Commission for the mitigation of the penalty and the exclusion of the two events from the SQI SAIDI[2] performance calculation.[3] With the exclusion, PSE will meet its SQI #3 SAIDI benchmark. Chapter 3: Electric Service Reliability demonstrates PSE's SAIFI[4] and SAIDI performance and PSE's effort to enhance its electric service reliability through the vegetation management and other on-going programs.

Background

PSE first implemented its Service Quality Program (the SQ Program) when the Washington Utilities and Transportation Commission (UTC, or WUTC, or the Commission) authorized the merger of Washington Natural Gas Company and Puget Sound Power & Light Company in 1997.[5] The stated purpose of the SQ Program was to "provide a specific mechanism to assure customers that they will not experience deterioration in quality of service" and to "protect customers of PSE from poorly-targeted cost cutting." The SQ Program has been further extended[6] with various modifications to demonstrate PSE's continuous commitment to customer protection and quality service.

Service Quality Program

The Service Quality (SQ) Program includes three components:

- **Customer Service Guarantee**—The Customer Service Guarantee (CSG) provides for a $50 missed appointment credit for both natural gas and electric service. This guarantee became effective in 1997.
- **Restoration Service Guarantee**—The Restoration Service Guarantee (RSG) provides for a $50 electric outage restoration credit to a qualified PSE electric customer. This guarantee was established in 2008.
- **Service Quality Index (SQI)**—PSE reports annually to the UTC on the final performance of these nine SQIs. This document explains the SQIs, how they are calculated and PSE's performance on each of the SQIs for the performance year of 2015.

In addition to these three components, the SQ Program also prescribes reporting requirements for PSE's primary service providers. Several Service Provider Indices (SPIs) benchmark performances in areas of construction standards compliance, reliability/service restoration and kept appointments.

The SQ Program also includes PSE's gas emergency response plans for outlying areas, which are filed concurrently with this Report as Attachment B to the annual UTC SQI and Electric Service Reliability filing. Attachment C to the 2015 annual UTC SQI and Electric Service Reliability filing is PSE's 2015 Critical

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[2] System Average Interruption Duration Index

[3] The SQI SAIDI extraordinary weather events petition is filed concurrently with the 2015 annual SQI and Electric Service Reliability filing.

[4] System Average Interruption Frequency Index

[5] Under consolidated Docket Numbers UE-951270 and UE-960195.

[6] Under consolidated Docket Numbers UE-011570, UG-011571, UE-072300 and UG-072301.

Infrastructure Security Annual Report. This reporting contains a discussion of PSE's cybersecurity and physical security policies and related information for 2015.

SQI and Electric Service Reliability Report

This *Puget Sound Energy 2015 SQI and Electric Service Reliability Report* meets PSE's SQ Program reporting requirements[7] and the electric service reliability reporting requirements set forth by the UTC.[8,9] To facilitate external review of PSE's SQI and Electric Service Reliability performance, the two areas were combined starting with the 2010 reporting year.[10]

Overview of Performance

Table 1a summarizes PSE's 2015 SQI and Electric Service Reliability performance along with relevant service providers' performance metrics and the two service guarantees. PSE met seven of the nine Service Quality Indices under PSE's Service Quality Program.

Table 1a: SQI and Electric Service Reliability and Service Provider Performance Metrics

Key Measurement	Type of Metric	Benchmark/Description	2015 Performance Results	Achieved
Customer Satisfaction				
WUTC complaint ratio	**Service Quality Index #2**	**No more than 0.40 complaints per 1,000 customers, including all complaints filed with WUTC**	**0.23**	☑
Customer Access Center transactions customer satisfaction	**Service Quality Index #6**	**At least 90% satisfied (rating of 5 or higher on a 7-point scale)**	**94%**	☑
Field Service Operations transactions customer satisfaction	**Service Quality Index #8**	**At least 90% satisfied (rating of 5 or higher on a 7-point scale)**	**96%**	☑

[7] The performance benchmark, calculation and reporting of each of the Service Quality Indices (SQIs) in this Report reflect all modifications regarding SQI mechanics stipulated in the Twelfth Supplemental Order of Docket Numbers UE-011570 and UG-011571, Orders 1 and 2 of UE-031946, and Orders 12, 14, 16, 17, 18, 19,20, 21, and 23 of consolidated Docket Numbers UE-072300 and UG-072301.

[8] The Electric Service Reliability section of this Report reflects all of PSE's electric service reliability reporting requirements outlined in Docket No. UE-110060 and in the following sections of the electric service reliability WAC:

- WAC 480-100-388, Electric service reliability definitions,
- WAC 480-100-393, Electric service reliability monitoring and reporting plan,
- WAC 480-100-398, Electric service reliability reports.

[9] Two PSE commitments regarding the preparation of the Electric Service Reliability section, as outlined in Section F, Reporting of Customer Compliant Information, of Appendix D to Order 12 of consolidated Docket Numbers UE-072300 and UG-072301 (Section F), are also satisfied in this annual report. 1) Chapter 13 Customer Electric Reliability Complaints section describes how the customer complaint information is used in PSE's circuit reliability evaluation. Appendix M details PSE's actions to resolve these complaints. 2) Prior to the filing of each annual report, PSE used to invite UTC Staff and the Public Counsel Section of the Washington State Attorney General's Office ("Public Counsel") to discuss the format and content of the Electric Service Reliability section since the adoption of Order 12. However, as agreed to by Public Counsel, UTC Staff and PSE at the March 13, 2012 meeting, an annual external review meeting of PSE's reliability results prior to the filing is not required. If, however, an external meeting on the format and content of PSE's Electric Service Reliability section is called for by an external party or PSE, then Public Counsel should be invited.

[10] The annual reporting of the Service Quality Program and the electric service reliability was due separately before the UTC by February 15 and March 31 of each year, respectively. To facilitate external review, PSE filed a petition in October 2010 to consolidate the two reporting requirements, among other petition requests. The UTC granted PSE's petition in November 2010 (Order 17 of consolidated Docket Numbers UE-072300 and UG-072301) and the reporting consolidation became effective for the 2010 performance periods and each report thereafter.

Key Measurement	Type of Metric	Benchmark/Description	2015 Performance Results	Achieved
Customer Service				
Customer Access Center answering performance	Service Quality Index #5	At least 75% of calls answered by a live representative within 30 seconds of request to speak with live operator	70%	
Operations Services—*Appointments*				
Appointments kept	Service Quality Index #10	At least 92% of appointments kept	100%[11]	☑
Service provider appointments kept—Quanta Electric	Service Provider Index #3B[12]	At least 98% of appointments kept	99%	☑
Service provider appointments kept—Quanta Gas	Service Provider Index #3C	At least 98% of appointments kept	99%	☑
Customer Service Guarantee	Service Guarantee #10	A $50 credit to customers when PSE fails to meet a scheduled SQI appointment	$16,250	--
Operations Services—*Gas*				
Gas safety response time	Service Quality Index #7	Average 55 minutes or less from customer call to arrival of field technician	29 minutes	☑
Secondary safety response time—Quanta Gas	Service Provider Index #4D	Within 60 minutes from first response assessment completion to second response arrival	46 minutes	☑
Key Measurement	**Type of Metric**	**Benchmark/Description**	**2015 Performance Results**	**Achieved**
Service provider standards compliance—Quanta Gas	Service Provider Index #1C	At least 97% compliance with site audit checklist points	99%	☑

[11] Results shown are rounded to the nearest whole percentage per UTC order. However, the 100% 2015 annual performance result does not reflect that PSE and its service providers met all the appointments during the reporting period. Numbers of missed appointments by appointment type are detailed in Appendix F: *Customer Service Guarantee Performance Detail*.

[12] There was no result for Service Provider Indices #1A, #2A, #3A and #4A. These indices were assigned to a service provider, Pilchuck, which no longer works for PSE. PSE transitioned all natural gas construction and maintenance work to Quanta Gas as of April 30, 2011. Service Provider Indices #2B and #2C, Service Provider Customer Satisfaction for Quanta Electric and Quanta Gas, respectively, were applicable in the prior years' reporting had been ended since the 2013 reporting period.

Operations Services—*Electric*				
Electric safety response time	**Service Quality Index #11**	**Average 55 minutes or less from customer call to arrival of field technician**	**54 minutes**	☑
Secondary Core-Hours, Non-Emergency Safety Response and Restoration Time—Quanta Electric	**Service Provider Index #4B**	**Within 250 minutes from the dispatch time to the restoration of non-emergency outage during core hours**	**258 minutes**	
Secondary Non-Core-Hours, Non-Emergency Safety Response and Restoration Time—Quanta Electric	**Service Provider Index #4C**	**Within 316 minutes from the dispatch time to the restoration of non-emergency outage during non-core hours**	**297 minutes**	☑
Service provider standards compliance—Quanta Electric	**Service Provider Index #1B**	**At least 97% compliance with site audit checklist points**	**99%**	☑
Restoration Service Guarantee	**Service Guarantee #2**	**A $50 credit to eligible customers when a power outage is longer than 120 consecutive hours**	**$0**	**--**
Electric Service Reliability—*SAIFI & SAIDI*				
$SAIFI_{Total}$ Total (all outages current year) Outage Frequency—System Average Interruption Frequency Index (SAIFI)	**Reliability**	**Power interruptions per customer per year, including all types of outage event**	**2.18 interruptions**	**--**

Key Measurement	Type of Metric	Benchmark/Description	2015 Performance Results	Achieved
$SAIFI_{Total\ 5\text{-}year\ Average}$ Total (all outages five-year average) SAIFI	**Reliability**	**Five years average of the power interruptions per customer per year, including all types of outage event**	**1.44 interruptions**	**--**
$SAIFI_{5\%}$ <5% Non-Major-Storm (<5% customers affected) SAIFI	**Service Quality Index #4**	**No more than 1.30 interruptions per year per customer**	**1.11 interruptions**	**☑**
$SAIFI_{IEEE}$ IEEE Non-Major-Storm (T_{MED}) SAIFI	**Reliability**	**Power interruptions per customer per year, excluding days exceeding the T_{MED} threshold**	**1.04 interruptions**	**--**
$SAIDI_{Total}$ Total (all outages current year) Outage Frequency–System Average Interruption Duration Index (SAIDI)	**Reliability**	**Outage minutes per customer per year, including all types of outage event**	**760 minutes**	**--**
$SAIDI_{Total\ 5\text{-}year\ Average}$ Total (all outages five-year average) SAIDI	**Service Quality Index #3**	**No more than 320 minutes per customer per year**	**361 minutes[13]**	
$SAIDI_{5\%}$ <5% Non-Major-Storm (<5% customers affected) SAIDI	**Reliability**	**Outage minutes per customer per year, excluding outage events that affected 5% or more customers**	**180 minutes**	**--**
$SAIDI_{IEEE}$ IEEE Non-Major-Storm (T_{MED}) SAIDI	**Reliability**	**Outage minutes per customer per year, excluding days exceeding the T_{MED} threshold**	**163 minutes**	**--**

[13] With the UTC's approval of PSE's petition, the new SAIDI value is 272 minutes.

Detailed SQI monthly performance results and supplemental information can be found in the following appendices:

- **Appendix A: Monthly SQI** Performance—This appendix details monthly PSE SQI performance and the relevant performance of PSE's service providers. The attachments to this appendix provide information on the major outage event and localized electric emergency event days and the natural gas reportable incidents and control time. This appendix has three attachments:
  - **Attachment A to Appendix A**—Major Event and Localized Emergency Event Days (Affected Local Areas Only),
  - **Attachment B to Appendix A**—Major Event and Localized Emergency Event Days (Non Affected Local Areas Only),
  - **Attachment C to Appendix A**—Gas Reportable Incidents and Control Time.
- **Appendix B: Certification of Survey Results**—The independent survey company, EMC Research, certify that all SQI-related customer surveys were conducted with applicable guidelines and the results are unbiased and valid in accordance with the survey procedures established in consolidated Docket Nos. UE-011570 and UG-011571[14].
- **Appendix C: Penalty Calculation**—This appendix shows penalty calculations and allocation with or without UTC approval of PSE's mitigation petition for a penalty relief from UTC.
- **Appendix D: Proposed Customer Notice (Report Card)**—This appendix presents PSE's proposed 2015 customer service performance report cards with or without SQI SAIDI penalty, depending the UTC approval. The Customer Service Performance Report Card is designed to inform customers of how well PSE delivers its services in key areas to its customers.
- **Appendix E: Disconnection Results**—This appendix provides the number of disconnections per 1,000 customers for non-payment of amounts due when the UTC disconnection policy would permit service curtailment.
- **Appendix F: Customer Service Guarantee Performance Detail**—This appendix details annual and monthly Kept Appointments and Customer Service Guarantee payments results by appointment type.
- **Appendix G: Customer Awareness of Customer Service Guarantee**—This appendix discusses the ways PSE makes customers aware of its Customer Service Guarantee and the results of the survey.

Detailed Electric system and reliability information is found in the following appendices:

- **Appendix H: Electric Reliability Terms and Definitions**—This appendix discusses the terms and definitions found in this report.
- **Appendix I: Electric Reliability Data Collection Process and Calculations**—This appendix discusses data collection methods and issues. It explains how the various data were collected.
- **Appendix J: Current Year Electric Service Outage by Cause by Area**—This appendix details the 2015 Outage Cause by County.

[14] PSE's compliance filing pursuant to the paragraph 13 of Order 21 of Docket Nos. UE-072300 and UG-072301 (consolidated), Granting in Part, and Denying in Part, Puget Sound Energy, Inc's Petition for Waiver and Suspension of Service Quality Index Nos. 6 AND 8 (June 21, 2013)

- **Appendix K: Historical SAIDI and SAIFI by Area**—This appendix details the three-year history of SAIDI and SAIFI data by county.
- **Appendix L: 1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements**—This appendix presents PSE SAIFI and SAIDI performance from 1997 through the current year using different measurements.
- **Appendix M: Current-Year Commission and Rolling-Two-Year PSE Customer Electric Service Reliability Complaints with Resolutions**—This appendix lists the current-year UTC and rolling-two year PSE customer electric service reliability complaints with resolutions.
- **Appendix N: Areas of Greatest Concern with Action Plan**—This appendix details the areas of greatest concern with an action plan.
- **Appendix O: Current Year Geographic Location of Electric Service Reliability Customer Complaints on Service Territory Map with Number of Next Year's Proposed Projects and Vegetation-Management Mileage**—This appendix illustrates current-year geographic location of electric service reliability customer complaints on service territory map with number of next year's proposed projects and vegetation-management mileage.

Customer Notice of SQI Performance

Appendix D: **Proposed Customer Notice (Report Card)** is PSE's proposed customer notice of PSE's 2015 SQI performance. After consultation with the UTC staff and Public Counsel, PSE will begin distributing the final SQI report card by June 25, 2016, as part of the customer billing package.

Unusual Events

There were two extraordinary weather events that occurred in August and November 2015 that affected PSE's service quality performance, especially SAIDI. In 2015, it took PSE's crews longer to restore power in the aftermath of two severe, damaging windstorms due to a very high number of fallen trees, which were weakened by the year's extreme drought conditions and prevented our crews from immediate access to neighborhoods.

PSE's preparation and readiness before the events and PSE's restoration and communication efforts during and after the events can found in the petition that is filed with WUTC concurrently with this Report. PSE's SQ program mechanics provides a provision for the exclusion of any unusual event from the SQI SAIDI calculation with WUTC's approval.

Changes in 2015

There was no data gathering or reporting difficulty in 2015 that impacted the SQI performance categories, or their results, in any way.

CHAPTER 2

CUSTOMER SERVICES AND SATISFACTION AND OPERATIONS SERVICES

PSE has been meeting the Puget Sound region's energy needs for more than 135 years. PSE proudly embraces the responsibility to provide customers with safe, reliable, reasonably priced energy service.

This section summarizes the 2015 results of PSE's seven service quality indices (SQIs) related to customer services and satisfaction and operation services:

- WUTC Complaint Ratio (SQI #2)
- Customer Access Center Answering Performance (SQI #5)
- Customer Access Center Transactions Customer Satisfaction (SQI #6)
- Field Operations Transactions Customer Satisfaction (SQI #7)
- Field Service Operations Transactions Customer Satisfaction (SQI #8)
- Appointments Kept (SQI #10)
- Electric Safety Response Time (SQI #11)
- Service Provider Performance
- Service Guarantees

WUTC Complaint Ratio (SQI #2)

Table 2a: WUTC Complaint Ratio for 2015

Key Measurement	Type of Metric	Benchmark/Description	2015 Performance Results	Achieved
Customer Satisfaction				
WUTC complaint ratio	**Service Quality Index #2**	**No more than 0.40 complaints per 1,000 customers, including all complaints filed with WUTC**	**0.23**	☑

Overview

Each year the UTC receives complaints from PSE customers on a variety of topics. In 2015, there were a total of 446 complaints, up from 391 in 2014. The total year-end customer count was 1.9 million. The 2015 SQI #2 complaint ratio was 0.23.

About the Benchmark

The WUTC complaint ratio is calculated by dividing the sum of all gas and electric complaints reported to the UTC by the average monthly number of PSE customers. The quotient is then multiplied by 1,000. The formula follows:

$$WUTC\ complaint\ ratio = \frac{electric\ and\ gas\ complaints\ recorded\ by\ WUTC}{average\ monthly\ number\ of\ electric\ and\ gas\ customers}\ X\ 1{,}000$$

The average monthly customer count is the average of the total number of PSE customers, per month, during the reporting period.

Going Forward

PSE will continue identifying potential issues that could trigger any customer complaints. The focus is on prevention of the cause of these issues through timely and accurate support for each customer. Areas of focus for 2016 include:

- Continue to focus on UTC "Consumer Upheld" complaint dispositions to identify root cause, establishment of preventive and corrective actions, and follow up to determine the effectiveness of the actions.
- Continue to improve PSE's company-wide customer experience by using knowledge gained in managing escalated complaints for training and education of others in PSE.
- Continue to work with the UTC staff to make complaint response and resolution processes more efficient for UTC and PSE.

Customer Access Center Answering Performance (SQI #5)

Table 2b: Customer Access Center Answering Performance for 2015

Key Measurement	Benchmark	2015 Performance Results	Achieved
Customer Service			
Customer Access Center answering performance (SQI #5)	**At least 75% of calls answered by a live representative within 30 seconds of request to speak with live operator**	**70%**	**No**

Overview

PSE's Customer Care Center (i.e. Customer Access Center) receives most of PSE's customer inquiries and typically represents PSE to customers. Customers calling PSE have the option of going into an Interactive Voice Response (IVR) system where they are able to perform self-serve transactions or to speak with a representative. PSE's customer service representatives (CSRs) answer calls promptly providing customers with the information or assistance they require, including natural gas and electric emergencies.

The Service Quality Program's benchmark for the Customer Care Center's call answering performance is to answer at least 75% of calls within 30 seconds on an annual basis. This goal is achieved through training on quality, efficient call handling and adherence to CSR performance expectations.

In 2015, the CSRs answered 70 percent of the calls within 30 seconds of customer requests. There were four main components which attributed to PSE's failure to meet this SQI:

- Change in collection & disconnect procedure led to increased calls and lengthier call times
- Unseasonal outages and storm activity drove customers to call PSE and experience longer-than-usual wait times during last August's widespread power outage
- Failures on PSE's technology systems that support online and self-serve outage reporting and information tools
- Training and hiring new representatives caused staffing challenges

About the Benchmark

The Customer Care Center call answering performance is measured from the time the customer initiated a request to speak with a CSR until a CSR arrived on the line. The annual performance is determined by the average of the 12 monthly call answering performance percentages. The calculation of the monthly answering performance is demonstrated through the following formula:

$$\textit{Monthly call answering performance} = \frac{\textit{aggregate number of calls answered by a company rep within 30 seconds}}{\textit{aggregate number of calls received}}$$

Busy Calls

PSE's phone system is configured with a backup system to handle overflow customer calls to 1-888-Call-PSE. Overflow calls from PSE's main IVR system are routed to a separate IVR system provided by PSE's phone service vendor that enables customers to contact PSE through a different channel. Almost all 2.4 million calls received in 2015 to 1-888-Call-PSE either went through the main or the overflow phone backup system, with the exceptions of following dates:

Date	No. of Busy	Cause
June 20th	3,186	IVR/script upgrade
August 6th	29	Power outage during preventive maintenance of phone system
August 29th	11	Major storm event
November 17th	2	Major storm event
November 30th	2	PSE Bothell data center outage

Going Forward

PSE is engaged in initiatives to further the Customer Care Center's answering performance and ensure the performance benchmark of 75% will be achieved. In 2016, PSE will:

- Enhance and deliver on-going agent training to improve proficiency and elevate the customer experience
- Explore improved self-service options that allow customers to complete various transactions online and drives down incoming calls into the call center
- Continually improve processes to optimize efficiency and leverage the potential of the CIS system
- Continue to improve the quality of each customer contact through the ongoing collaboration and efforts with the Quality & Analysis team
- Reevaluate the collection and disconnect process to ensure business practice is sound

Customer Access Center Transactions Customer Satisfaction (SQI #6)

Table 2c: Customer Access Center Transactions Customer Satisfaction for 2015

Key Measurement	Type of Metric	Benchmark/Description	2015 Performance Results	Achieved
Customer Satisfaction				
Customer Access Center transactions customer satisfaction	**Service Quality Index #6**	**At least 90% satisfied (rating of 5 or higher on a 7-point scale)**	**94%**	☑

Overview

Most of the telephone calls to PSE go to the PSE Customer Care Center (i.e. Customer Access Center). EMC Research, an independent research company for PSE's Service Quality Program[15], conducted telephone surveys with PSE customers and prepared monthly and semi-annual reports on customer satisfaction regarding Customer Access Center transactions during the 2015 SQ Program year. The independent survey-results found that 94% of customers surveyed were satisfied with Customer Access Center's overall transaction performance (SQI #6). This is a 1% improvement over the 2014 survey results of 93%.

About the Benchmark

An independent research company conducts phone surveys to customers who have made calls to PSE and asks the following question:

> "Overall, how would you rate your satisfaction with this call to Puget Sound Energy? Would you say 7-completely satisfied, 1-not at all satisfied or some number in between?"

A customer is considered to be satisfied if they responded 5, 6 or 7. The annual performance is determined by the weighted monthly average percent of satisfied customers. The formula for the monthly percentage follows:

$$\textit{Monthly percentage of satisfied customers} = \frac{\textit{aggregate number of survey responses of 5, 6 or 7}}{\textit{aggregate number of survey responses of 1, 2, 3, 4, 5, 6 or 7}}$$

[15] SQI-related customer surveys were conducted with applicable guidelines and the results are unbiased and valid in accordance with the survey procedures established in consolidated Docket Nos. UE-011570 and UG-011571. PSE's compliance filing pursuant to the paragraph 13 of Order 21 of Docket Nos. UE-072300 and UG-072301 (consolidated), Granting in Part, and Denying in Part, Puget Sound Energy, Inc's Petition for Waiver and Suspension of Service Quality Index Nos. 6 AND 8 (June 21, 2013)

Going Forward

PSE recognizes that continuous improvements are required to maintain customer satisfaction.

Areas of focus for 2016 include:

- Continue to enhance the quality assurance audit process. The quality assurance process will improve the customer experience at each customer touch point within the Customer Care Center. It will also contribute to improve:
  - Regulatory compliance assurance
  - The information provided to customers
  - Customer Care Center management
  - Response to customer questions
- Continue deployment of soft-skills training program to improve handling for call control, mitigate escalated calls, and improve overall customer experience.

Gas Safety Response Time (SQI #7)

Table 2d: Gas Safety Response Time for 2015

Key Measurement	Type of Metric	Benchmark/Description	2015 Performance Results	Achieved
Operations Services				
Gas Safety Response Time	**Service Quality Index #7**	**Average 55 minutes or less from customer call to arrival of field technician**	**29 minutes**	☑

Overview

The primary responsibility of PSE's Gas First Response (GFR) team is to respond to natural gas emergencies. In 2015, PSE responded to more than 21,500 calls concerning natural gas safety. These emergencies include reports of inside or outside odors, third-party damage to PSE's system, leaks and carbon monoxide concerns. The GFR team also supports local and state first-response organizations, such as fire departments. PSE has GFR personnel located throughout its service territory. These responders are available on a 24/7/365 basis.

In addition to responding to the natural gas emergencies, the GFR team performs various natural gas system maintenance and inspection activities, adjusts and performs minor repairs on customer equipment and monitors construction excavation when it occurs near certain underground facilities.

About the Benchmark

The gas safety response time is calculated by logging the time each customer service call is created and the time the gas field technician arrives on site. The calculated response times for each service call are averaged for all emergency calls during the performance year to determine the overall annual performance.

$$\textit{Gas safety response time annual performance} = \frac{\textit{sum of all natural gas emergency response times}}{\textit{annual number of natural gas emergency calls received}}$$

Going Forward

In 2016, PSE will focus on the following:

- Continue to monitor and evaluate emergency response time data daily.
- Adjust processes, balance workload with staffing, make necessary shift adjustments, and provide continuous employee coaching.
- Continue to use the mobile workforce dispatch system functionality for computer-aided dispatching.

Field Service Operations Transactions Customer Satisfaction (SQI #8)

Table 2e: Field Service Operations Transactions Customer Satisfaction for 2015

Key Measurement	Type of Metric	Benchmark/Description	2015 Performance Results	Achieved
Customer Satisfaction				
Field Service Operations transactions customer satisfaction	**Service Quality Index #8**	**At least 90% satisfied (rating of 5 or higher on a 7-point scale)**	**96%**	☑

Overview

EMC Research[16], an independent research company, conducts telephone surveys with PSE customers who have requested and received natural gas field service. In 2015, these surveys found that 96% of customers were satisfied with PSE's field service operations transaction performance.

About the Benchmark

Every week, EMC Research contacts randomly-selected customers who have called PSE the previous week and received natural gas field service. The firm prepares monthly and semi-annual reports on PSE's field service operations transaction performance.

Customers are asked a number of questions including the following question for the purpose of SQI #8:

> "Thinking about the entire service, from the time you first made the call until the work was completed, how would you rate your satisfaction with Puget Sound Energy? Would you say 7- completely satisfied, 1- not at all satisfied or some number in between?"

A customer is considered to be "satisfied" if they responded 5, 6 or 7.

The annual performance is determined by the weighted monthly average of percent of satisfied customers. The formula for the monthly percentage follows:

$$\textit{Monthly percent of satisfied customers} = \frac{\textit{aggregate number of survey responses of 5, 6 or 7}}{\textit{aggregate number of survey responses of 1, 2, 3, 4, 5, 6 or 7}}$$

[16] SQI-related customer surveys were conducted with applicable guidelines and the results are unbiased and valid in accordance with the survey procedures established in consolidated Docket Nos. UE-011570 and UG-011571. PSE's compliance filing pursuant to the paragraph 13 of Order 21 of Docket Nos. UE-072300 and UG-072301 (consolidated), Granting in Part, and Denying in Part, Puget Sound Energy, Inc's Petition for Waiver and Suspension of Service Quality Index Nos. 6 AND 8 (June 21, 2013)

Going Forward

In 2016 PSE will focus on the following:

- Continue to monitor customer satisfaction survey data and provide feedback to field service technicians to ensure a high level of customer service is maintained.
- Continue to review customer comments on the survey to identify changes in PSE's current operation and business processes that may be implemented to provide greater customer satisfaction.
- Continue to evaluate new tools and technologies that would enable a higher level of customer service and convenience.

Appointments Kept (SQI #10)

Table 2f: Appointments Kept for 2015

Key Measurement	Type of Metric	Benchmark/Description	2015 Performance Results	Achieved
Operations Services				
Appointments kept	**Service Quality Index #10**	**At least 92% of appointments kept**	**100%** Note	☑

Note: Results shown are rounded to the nearest whole percentage per UTC order. Therefore, the 100% 2015 performance result does not reflect that PSE and its service providers met all the appointments during the reporting period. Numbers of missed appointments by appointment type are detailed in Appendix F: *Customer Service Guarantee Performance Detail.*

Overview

PSE provides its customers with a variety of scheduled service appointments including:

- **Permanent service**—Permanent natural gas service from an existing main or permanent secondary voltage electric service from existing secondary lines.
- **Reconnection of existing service**—Reconnection following move-out, move-in or disconnection for non-payment.
- **Natural gas diagnostic service request**—For water heater, furnace checkup, furnace not operating, other diagnostic or repair or follow-up appointments.

Service appointments that involve safety do not require scheduling and are performed on a 24/7/365 basis. These non-scheduled services include restoring electric service or responding to a reported gas odor.

When a gas or electric customer requests a scheduled service, PSE provides the customer with either a guaranteed appointment date and time-frame or a guaranteed commitment to provide service on or before a specified date.

In 2015, PSE achieved a result of 100% (or 99.6% before the rounding) for this appointments kept metric. Data on missed appointments and other appointment information by service type is detailed in Appendix F: *Customer Service Guarantee Performance Detail.*

About the Benchmark

The appointments kept SQI is calculated by dividing the number of appointments kept by the total number of appointments made. The formula follows:

$$Appointments\ kept = \frac{annual\ appointments\ kept}{annual\ appointments\ missed + annual\ appointments\ kept}$$

Appointments are considered missed when PSE does not arrive during the time period or on the agreed upon date except when the appointments have been missed due to the following reasons:

- The customer fails to keep the appointment
- The customer calls PSE to specifically request the appointment be rescheduled
- PSE reschedules the appointment because conditions at the customer site make it impractical to perform the service
- The appointment falls during an SQI Major Event[17] period

These types of appointments are not considered missed appointments but "excused" appointments.

Appointments that were canceled by the customer, regardless of the customer's reason, will be considered "canceled" appointments.

Excused and canceled appointments are not counted as either kept or missed appointments.

Additional appointments to complete repairs are considered new appointments.

Going Forward

In 2016 PSE will focus on the following:

- Continue to review the reasons for missed appointments and work to find solutions so that PSE can meet all its customer commitments.
- Continue to evaluate tools and technologies that would enable a higher level of customer service and convenience.

[17] Major Event Days when 5% or more electric customers are without power during a 24 hour period and associated carry-forward days that it will take to restore electric service to these customers, which are excluded from the performance calculations of SQI #4-SAIFI and SQI #11-Electric safety response time.

Electric Safety Response Time (SQI #11)

Table 2g: Electric Safety Response Time for 2015

Key Measurement	Type of Metric	Benchmark/Description	2015 Performance Results	Achieved
Operations Services				
Electric Safety Response Time	**Service Quality Index #11**	**Average 55 minutes or less from customer call to arrival of field technician**	**54 minutes, 29 seconds**	☑

Overview

PSE's Electric First Response (EFR) team has the primary responsibility of responding to electric outages and electric emergencies. Examples of the types of outages and emergency events that PSE responds to include downed wires, equipment failures, car-pole accidents, bird- and animal-related outages, trees or limbs on lines, third-party dig-ins and voltage quality problems.

EFR personnel are located throughout PSE's service territory and are available to respond on a 24/7/365 basis. EFR's priority is to ensure public and worker safety and then to restore service to customers. After addressing safety concerns, service restoration is made through temporary or permanent repairs or reconfiguration of the electric system. If the repair is beyond the capability of EFR personnel, construction crews are called in to make permanent repairs. PSE responded to more than 14,901 electric incidents in 2015.

About the Benchmark

The electric safety response time is calculated by logging the time of each customer service call and the time the EFR personnel arrives on site. The annual performance is determined by the average number of minutes from the time a customer calls to the arrival of the EFR personnel for electric safety incidents occurring during the performance year. The formula follows:

$$\textit{Annual electric safety response time} = \frac{\textit{sum of all response times}}{\textit{annual number of electric safety incidents}}$$

Certain incidents are excluded from the measurement if they occurred during the following days:

- Major Event Days when 5% or more electric customers are without power during a 24-hour period and associated carry-forward days that it will take to restore electric service to these customers.
- Localized emergency event days when all available EFR in a local area are dispatched to respond to service outages.

Going Forward

In 2016, PSE will continue its efforts to improve communication and coordination among EFR personnel, system operators and dispatchers to reduce electric safety incident response time. The efforts include:

- Continue to enhance the outage management system technology, providing improved electric system information to increase efficiency in managing outage events and first response personnel.
- Continue to analyze and optimize EFR shift scheduling to correspond with daily outage trends.
- Continue to improve switching efficiency between PSE's service provider, EFR and substation operators to better utilize any qualified personnel that are the closest available to the outage to perform system switching.
- Continue to improve the process to check single customer outage reports for accuracy before dispatching field resource.

Service Provider Performance

Table 2h: Service Provider Performance for 2015

Key Measurement	Type of Metric	Benchmark/Description	2015 Performance Results	Achieved
Customer Services and Satisfaction and Operations Services				
Service provider standards compliance—Quanta Electric	**Service Provider Index #1B**	**At least 97% compliance with site audit checklist points**	**99%**	☑
Service provider standards compliance—Quanta Gas	**Service Provider Index #1C**	**At least 97% compliance with site audit checklist points**	**99%**	☑
Service provider appointments kept—Quanta Electric	**Service Provider Index #3B**	**At least 98% of appointments kept**	**99%**	☑
Service provider appointments kept—Quanta Gas	**Service Provider Index #3C**	**At least 98% of appointments kept**	**99%**	☑
Secondary safety response time—Quanta Gas	**Service Provider Index #4D**	**Within 60 minutes from first response assessment completion to second response arrival**	**46 minutes**	☑
Secondary Core-Hours, Non-Emergency Safety Response and Restoration Time—Quanta Electric	**Service Provider Index #4B**	**Within 250 minutes from the dispatch time to the restoration of non-emergency outage during core hours**	**258 minutes**	
Secondary Non-Core-Hours, Non-Emergency Safety Response and Restoration Time—Quanta Electric	**Service Provider Index #4C**	**Within 316 minutes from the dispatch time to the restoration of non-emergency outage during non-core hours**	**297 minutes**	☑

Overview

This section details the service provider metrics relevant to PSE's SQ Program. PSE monitors and assesses the performance of its primary natural gas and electric service providers (Quanta Gas and Quanta Electric). The metrics addresses PSE standards compliance, new construction service appointments, and safety response and restoration time. Each measure is designed to monitor and improve PSE's service. There were no results for Service Provider Indices (SPI) #1A, #2A, #3A and #4A. These indices were assigned to a service provider, Pilchuck that no longer works for PSE. PSE transitioned all natural gas construction and maintenance work to Quanta Gas as of April 30, 2011.

Service Provider Indices #2B and #2C, Service Provider Customer Satisfaction, Quanta Electric and Quanta Gas, respectively, which were applicable in prior years' reports, have been terminated since the 2013 reporting period.

In 2015, the Secondary Core-Hours, Non-Emergency Safety Response and Restoration Time—Quanta Electric benchmark was missed with a value of 258 minutes instead of the 250 minute benchmark. In 2014 the performance was 248 minutes. The primary driver for missing this benchmark was an increase in outages requiring a crew, particularly an increase in cable outages during the summer.

About the Benchmark

- Service Provider Standards Compliance (SPI #1): Service providers must meet a minimum of 95 percent compliance with PSE's site audit checklists.
- Service Provider New Customer Construction Appointments Kept (SPI #3):
  - Quanta Gas and Quanta Electric must keep at least 98% of their new customer construction appointments.
- Secondary Safety Response Time (SPI #4): This SPI consists of three sub-indices:
  - Service Provider Indices #4B and #4C — Quanta Electric's secondary safety response and restoration time during core and non-core hours, respectively. Quanta Electric must respond and complete power restoration in less than 250 minutes on average during core hours and less than 316 minutes on average during non-core hours. Core hours are 7:00 a.m.–5:30 p.m., Monday through Friday, except holidays. Restoration time is measured from the time a Quanta Electric crew is dispatched to the time the problem causing the interruption has been resolved and the line has been re-energized. Both the core-hours and non-core-hours measurements exclude emergency events and significant storm events.
  - Service Provider Index #4D—Secondary safety response time—Quanta Gas. Quanta Gas must respond within 60 minutes on average from PSE's Gas First Response assessment completion to the service provider's secondary response arrival.

Service Provider Appointments and Related Penalties

Table 2i shows the number of new customer construction appointments completed by PSE service providers and the amount of penalties paid due to missed appointments.

Table 2i: 2015 Service Provider Appointments and Missed Appointment Penalties for 2015

Service Provider Appointments				Missed Appointment Penalties		
Service Provider	Electric	Natural Gas	Total	Electric	Natural Gas	Total
Quanta Gas	N/A	9,484	9,484	N/A	$8,700	$8,700
Quanta Electric	7,704	N/A	7,704	$4,850	N/A	$4,850
Total	**7,704**	**9,484**	**17,188**	**$4,850**	**$8,700**	**$13,550**

Going Forward

PSE and our service providers will continue the following initiatives for 2016:

- Identify areas of improvement to meet core-hour benchmark of 250 minutes.
- Partner with large municipalities to improve the permitting process.
- Identify and implement improvements to customer scheduling for new construction.

Service Guarantees

Overview

PSE offers two service guarantees to its customers: Customer Service Guarantee (Service Guarantee #1) and Restoration Service Guarantee (Service Guarantee #2).

PSE promotes its Customer Service Guarantee and the Restoration Service Guarantee on *PSE.com*, the back of billing stock, and on the billing/return envelope. It is also highlighted in the customer newsletter[18] as part of customer bill inserts. PSE also surveys its customers monthly about the Customer Service Guarantee. Appendix G discusses the ways PSE has made customers aware of its Customer Service Guarantee and the results of the customer awareness survey.

Customer Service Guarantee

The Customer Service Guarantee (CSG) is designed to give customers a $50 missed appointment credit if PSE or its service providers fail to arrive by the mutually agreed upon time and date to provide one of the following types of service:

- **Permanent service**—Permanent natural gas service from an existing main or permanent secondary voltage electric service from existing secondary lines.
- **Reconnection**—Reconnection following move-out, move-in or disconnection for non-payment.
- **Natural gas diagnostic service request**—For water heater, furnace checkup, furnace not operating, other diagnostic or repair or follow-up appointments.

This service appointment guarantee applies in the absence of Major Storms, earthquakes, supply interruptions or other adverse events beyond PSE's control. In these cases, PSE will reschedule service appointments as quickly as possible.

The number of CSG by energy, service type, and month is detailed in Appendix F: *Customer Service Guarantee Performance Detail.* For additional detail on the promotion and communication of CSG, see Appendix G: *Customer Awareness of Customer Service* Guarantee.

[18] SQI settlement requirement: "A promotion of the customer service guarantee will be included in the customer newsletter, "EnergyWise," at least three times per year."

Restoration Service Guarantee

Whenever a customer experiences a 120 consecutive-hour power outage, the customer may be eligible for a $50 Restoration Service Guarantee (RSG) credit. The total annual payments are limited to $1.5 million, or 30,000 customers, payable to eligible customers who request such payment or report their outage on a first-come, first-served basis. The pledge is always applicable but will be suspended if PSE lacks safe access to its facilities to perform the needed assessment or repair work. To receive the RSG credit, affected customers must report the outage or request the credit within seven days of their service restoration.

The availability of the Restoration Service Guarantee is emphasized and messaged in PSE's phone system when customers call and report their outage during a major outage event, when 5% or more PSE electric customers are without power, or when PSE opens its Emergency Operations Center in response to a significant outage event.

2015 Service Guarantees Credits
Customer Service Guarantee Credits

In 2015, PSE credited customers a total of $16,250 for missing 325 of the 94,834 SQI #10 appointments. Table 2j provides summary values of Service Guarantee counts and payments to customers in 2015 by service type.

Table 2j: 2015 PSE SQI #10 Appointment Count and Customer Service Guarantee Credits

SQI #10 Appointment Count				Service Guarantee Payment to Customers		
Service Type	Electric	Natural Gas	Total	Electric	Natural Gas	Total
Permanent Service	7,704	9,484	17,188	$4,850	$8,700	$13,550
Reconnection	42,887	13,867	56,754	$1,700	$600	$2,300
Diagnostic	N/A	20,892	20,892	N/A	$400	$400
Total	**50,591**	**44,243**	**94,834**	**$6,550**	**$9,700**	**$16,250**

Appendix F: *Customer Service Guarantee Performance Detail* provides additional detail on missed appointments along with the credits paid by month and appointment service type as of December 31, 2015.

Restoration Service Guarantee Credits

PSE is committed to reviewing all prolonged outages that may trigger the Restoration Service Guarantee (RSG) and any customer requests for the RSG credit within 30 days of a request. For 2015, there was one prolonged outage event in September in Rochester, and two outage events in December in Easton, but there have not been any customer requests for a RSG credit due to these events.

CHAPTER 3

ELECTRIC SERVICE RELIABILITY

Safe and reliable electric service is one of PSE's paramount goals. Information in this report provides the Washington Utilities and Transportation Commission and our customers with reliability metrics on the services that PSE provides its customers.

Information on electric reliability is provided by the traditional reliability metrics including the number and duration of outages as measured against the Service Quality Index (SQI) approved by the UTC in 1997. Additionally, customer concerns about service quality and reliability are received either first-hand or through the UTC. Reported customer concerns provide an important perspective of electric reliability.

The following sections detail PSE's System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI) performance and discuss the annual reliability reporting requirements and results for the 2015 performance year. Based on the recorded outages, both SQI SAIDI and SQI SAIFI saw an increase in 2015 as compared to 2014, 25% and 9% respectively. PSE met the benchmark for SQI SAIFI but did not meet the benchmark for SQI SAIDI due to two extraordinary storm events during the year. In August, PSE's service territory was hit by the strongest summer storm in Northwest history[19]. In November, another intense wind event occurred in the service territory. Both of these windstorms are among the worst storm events in the last 10 years, only surpassed by the December 2006 wind event and the January 2012 snowstorm. Details concerning these storms can be found in the SAIDI (SQI #3) section. PSE is petitioning to have the two events excluded from the SQI SAIDI results. If those two events are excluded, PSE will meet the SQI SAIDI benchmark.

PSE continues to refine business processes and computer system interfaces with the Outage Management System (OMS), a Customer Information System (CIS) and an electric Geographical Information System (GIS) to ensure that all outage data is accurately documented. With the implementation of the OMS, outage data integrity was anticipated to be better than under CLX, PSE's legacy customer information and outage management system. The OMS, coupled with geospatial information from the GIS, produces a more accurate number of

[19] Cliff Mass Weather Blog, "The Strongest Summer Storm In Northwest History", Aug. 31, 2015, http://cliffmass.blogspot.com/2015/08/the-strongest-summer-storm-in-northwest.html

customers affected during an outage as compared to the number reported by CLX. The OMS has functionality to project all customers impacted, regardless if the customer reports the outage. The CLX system did not have the functionality to automatically include all customers affected by an outage; it only estimated the number of customers based on those customers who called in to report the outage. Experienced outage managers could adjust the CLX estimate based on their expertise but the number of reported customers out was still an estimated count rather than an exact figure. With this improvement in customer count accuracy associated with an outage, SAIDI and SAIFI results have trended upward without any degradation in reliability.

On November 30, 2015, PSE filed its proposed permanent modification of SQI SAIDI mechanics. The proposal included the following key changes to the SQI SAIDI mechanics: an annual SQI SAIDI performance determination that is consistent with the Institute of Electrical and Electronics Engineers (IEEE) standards; establishing a new benchmark that incorporates the IEEE standards and the effect of the new OMS; and an extraordinary event definition and threshold calculation that ensures consistent and reasonable measurement of SQI SAIDI performance and benchmark going forward. The 2015 SQI SAIDI petition is currently in the settlement phase of the adjudicated process that was initiated per Commission Order 26 on December 31, 2015.

Annually, PSE participates in a benchmarking survey coordinated by IEEE. IEEE collects information from participating utilities and documents the IEEE 1366[20] performance based on an individual ranking (#1 being the best) and within four quartiles (first quartile being the best). It's important to note that since participation is voluntary, the number of utilities that participate varies from year to year. While there are guidelines for how to provide the outage data, how each utility records its outages can and does create inconsistencies in the results. IEEE conducts the annual survey in the spring with results available in August for the outages that occurred in the preceding year. As a result, there is a year time-lag in reporting our annual rank. In the 2014 IEEE survey of 102 member utilities, PSE ranked 36th (2nd quartile) and 71st (3rd quartile) of SAIFI and SAIDI, respectively. PSE remained in the same quartiles as 2013. The results of the 2015 IEEE survey are expected in August 2016.

While PSE believes that this annual report provides useful information to interested parties for a given calendar year, PSE cautions against putting too much emphasis on the usefulness of annualized metrics in concluding trends pertaining to system performance. Factors such as variation in weather, natural disasters and normal random variation in events such as third-party damage will all impact year-to-year comparisons of system performance.

A single year's result may not lend to adequate identification of the best solution for long-term improvement, and actions taken based on an annual snapshot may result in Band-Aid solutions that may not meet long-term objectives. Notwithstanding the limits of using the annual reports to assess year-to-year trends, PSE believes the annual snapshots provide a useful view in context of the overall trends.

[20] Refer to Appendix H: *Terms and Definitions* for the IEEE 1366 definition.

PSE's electric system covers an eight county geographical area. Refer to Appendix O: *Current Year Geographic Location of Electric Service Reliability Customer Complaints on Service Territory Map with Number of Next Year's Proposed Projects and Vegetation Management Mileage* for a map of the service area.

SAIFI (SQI #4)

Overview

For electric companies, maintaining a high level of reliability requires constant commitment. Supplying power depends on an interconnected network of generation, transmission and distribution systems to get power to homes and businesses. Most customer interruptions can be traced to trees and equipment failure.

The System Average Interruption Frequency Index (SAIFI) measures the number of outages or interruptions per customer per year. Most electric utilities use this measurement in reviewing the reliability of their electrical system, excluding major outage events that cause interruptions to a significant portion of their customer base.

About the Benchmark

SAIFI is calculated by adding up the number of customers experiencing a sustained outage of 60 seconds or longer during the reporting period and then dividing it by the average annual number of electric customers. The formula follows:

$$\textit{Annual SAIFI} = \frac{\textit{Total annual customer interruptions}}{\textit{Average annual electric customer count}}$$

At PSE, for the purpose of measuring the SAIFI SQI, major outage events are excluded from the performance calculation. More details concerning major outage events are in the *Major Events* discussion in the *About Electric Service Reliability Measurements and Baseline Statistics* section.

The SQI SAIFI measurement is also referred to as $SAIFI_{5\%}$.

- **5% Exclusion SAIFI ($SAIFI_{5\%}$) (Non-major-storm SAIFI)**—Excludes customer interruptions during a Major Event. Major Events are defined as days when 5% or more of the electric customer base in a 24-hour period experiences power interruption and the days following (carried-forward days), until all those customers have service restored.

In addition to the SQI SAIFI measurement, PSE also reports on three additional key measurements:

- **Total SAIFI ($SAIFI_{Total}$)**—Includes all customer interruptions that occurred during the current reporting year, without exclusion.
- **Total 5-Year Average SAIFI ($SAIFI_{Total\ 5\text{-}year\ Average}$)**—Includes all customer interruptions that occurred during the current reporting year and the previous four years, except for events that have been approved by the UTC for exclusion.

- **IEEE SAIFI ($SAIFI_{IEEE}$)**—Measures the number of customer interruptions utilizing the IEEE standard 1366 methodology. Days that exceed the IEEE T_{MED}[21] are excluded. The 2015 T_{MED} is 6.10 minutes—that is, any day that exceeds 6.10 minutes per customer is excluded due to IEEE-defined Major Event Days.

The *About Electric Service Reliability Measurements and Baseline Statistics* section provides more detailed discussion of the four reporting measurements and the establishment of the 2003 results as the baseline statistic. Appendix L: *1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements* reports the historical results of the four measurements from 1997 through the current reporting year.

2015 SAIFI Results

The 2015 results based on the recorded outages are reported in Table 3a.

Table 3a: 2015 SAIFI Results

	Key Measurement	Benchmark	Baseline	Current Year Results	Achieved
$SAIFI_{Total}$	**Total (all outages current year) Outage Frequency–System Average Interruption Frequency Index (SAIFI)**	**n/a**	**1.24**	**2.18**	**--**
$SAIFI_{Total\ 5\text{-}year\ Average}$	**Total (all outages five-year average) SAIFI**	**n/a**	**1.37**	**1.44**	**--**
$SAIFI_{5\%}$ **(SQI #4)**	**<5% Non-Major-Storm (<5% customers affected) SAIFI**	**No more than 1.30 interruptions per year per customer**	**0.80**	**1.11**	☑
$SAIFI_{IEEE}$	**IEEE Non-Major-Storm (T_{MED}) SAIFI**	**n/a**	**0.71**	**1.04**	**--**

What Influences SAIFI

PSE tracks outages by cause codes and groups the outage causes into three major categories: tree-related, preventable and third party. System damage caused by trees and limbs during a major event continued to impact the most customers in 2015, as in previous years. The other major causes of outages were:

- Preventable:
  - Equipment failures—In addition to equipment that ceases to operate unexpectedly, this category also includes outages when a fuse properly operates to protect equipment when a

[21] Refer to Appendix H: *Terms and Definitions* for the IEEE T_{MED} definition

branch or tree brushes against the line. This represents approximately 15% of customer interruptions related to equipment failure.
  - Bird or animal

- Third Party:
  - Car-pole accidents
  - Scheduled outages for system maintenance or installation of new infrastructure

Figure 3a shows the common causes for the recorded outages in 2015 and their impact on customers across the four key measurements.

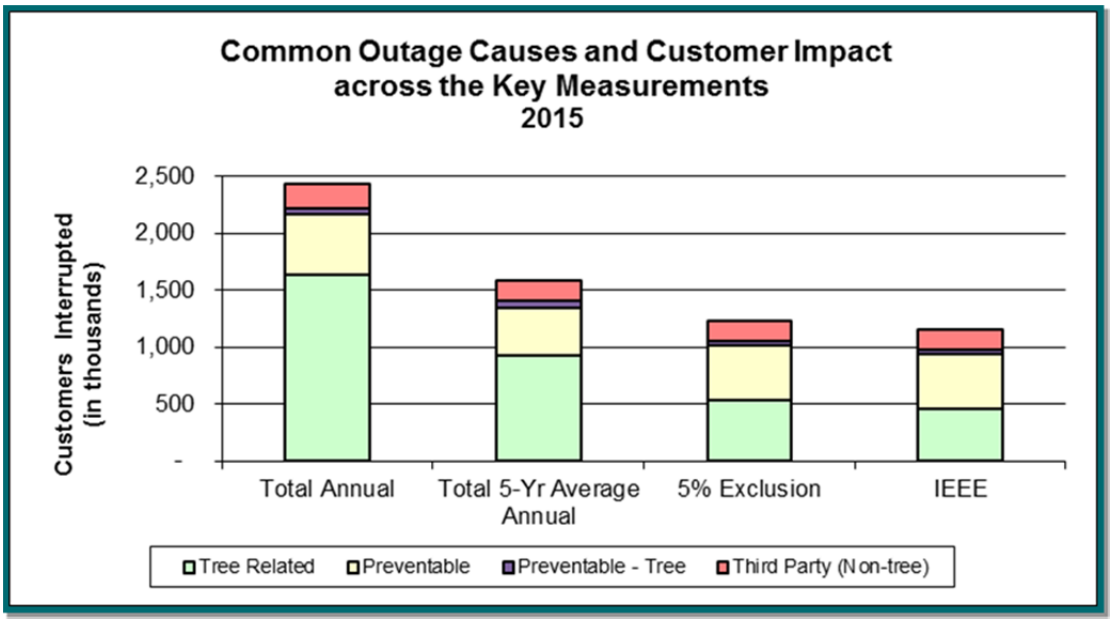


Figure 3a: Common Outage Causes and Customer Impact across the Key Measurements in 2015

Historical Trends for SAIFI

Table 3b shows SQI SAIFI from 2011 to 2015.

Table 3b: SQI SAIFI from 2011 to 2015 (excluding Major Events)

	2011	2012	2013	2014	2015
$SAIFI_{5\%}$ **(SQI #4)**	**1.02**	**0.92**	**0.86**	**1.05**	**1.11**
Benchmark	**1.30 interruptions per year per customer**				

As shown in Table 3b, the SQI SAIFI requirements have been met annually for the past five years.

Appendix L: *1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements* illustrates the comparison between the four SAIFI measurements for 1997–2015. Based on the recorded outages, the 2015 results across all measurements worsened when compared to 2014 as shown in Figure 3b. The driver of the decline in $SAIFI_{Total}$ and $SAIFI_{Total\ 5\text{-}Yr\ Average}$ measurements was driven by the tree-related outages as a result of the two extraordinary weather events in 2015. The $SAIFI_{5\%}$ and $SAIFI_{IEEE}$ measurements saw a slight decline in performance due to bird and animal outages within the preventable category. The warm spring led to a higher nesting success rate for squirrels and birds. As a result, with the increased population of small animals and birds, PSE experienced more animal related outages.

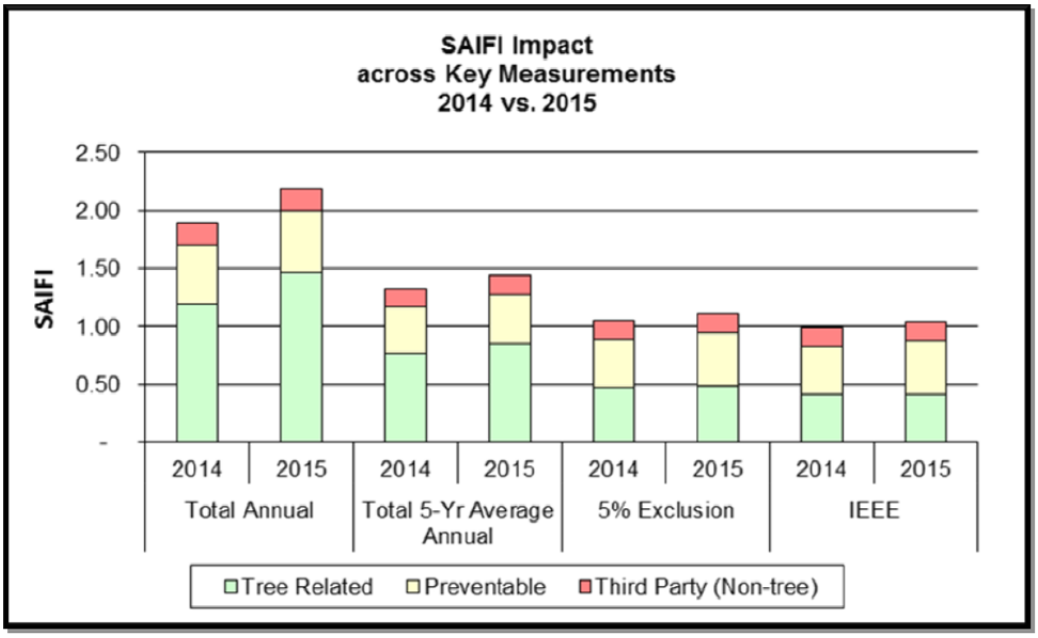


Figure 3b: SAIFI Impact across the Key Measurements 2014 vs. 2015

Appendix K: *Historical SAIDI and SAIFI by Area* illustrates the 2013–2015 results by county under the four measurements. A summary of Appendix K indicates that 2015 SAIFI performance varied in each county:

- Kittitas County saw an improvement across all four SAIFI measurements
- Thurston County saw an improvement in all measurements except for $SAIFI_{IEEE}$. The decline in performance was driven by car pole accidents and third party dig up of underground cable that affected a higher number of customers.
- Whatcom, Skagit, King, Pierce, and Kitsap Counties saw a decline in performance in one or both of the $SAIFI_{Total}$ and $SAIFI_{Total\ 5\text{-}year\ Average}$ measurements due to the August and November windstorms.
- The decline in King County $SAIFI_{5\%}$ and $SAIFI_{IEEE}$ performance was driven by tree-related outages affecting a higher number of customers
- The decline in Kitsap County $SAIFI_{5\%}$ and $SAIFI_{IEEE}$ performance was driven by the tree-related outages and equipment failures that affected a higher number of customers

As described more fully in the *Areas of Greatest Concern* discussion of the *About Electric Service Reliability Measurements and Baseline Statistics* section, PSE continues to focus on identifying projects that will improve SAIFI, while managing other aspects of electric system performance.

SAIDI (SQI #3)

Overview

Providing reliable electric service is a top priority of electric companies. PSE's maintenance programs (i.e. vegetation management and substation inspections), capital investments, and improvement efforts around response and repair time, are targeted to prevent or reduce the number and duration of outages. Despite PSE's best efforts, sometimes power outages are simply unavoidable. Most outage minutes are caused by equipment failure, trees and vegetation. When power failures occur, PSE works around the clock to restore service as soon as possible.

The System Average Interruption Duration Index (SAIDI) measures the number of outage minutes per customer per year. Most electric utilities use this measurement in reviewing the reliability of their electrical system, excluding outage events that cause interruptions to a significant portion of their customer base due to extreme weather or unusual events.

SAIDI is similar to SAIFI, but SAIDI measures the duration of customer interruptions while SAIFI measures the number of customer interruptions.

About the Benchmark

SAIDI is calculated by adding up the outage minutes of all the customers that have been without power and then dividing by the average annual number of electric customers. The formula for annual SAIDI follows:

$$\textit{Annual SAIDI} = \frac{\textit{Total annual customer outage minutes}}{\textit{Average annual electric customer count}}$$

Starting in the 2010 reporting year, the UTC approved a revision to the SQI SAIDI performance to be the average of total customer minutes from the current reporting year and the previous four years. This performance calculation better reflects the overall customer experience regarding power restoration and more adequately measures PSE's overall electric system reliability.

At PSE, the SQI SAIDI measurement is referred to as Total 5-Year Average SAIDI ($SAIDI_{\text{Total 5-year Average}}$).

- **Total 5-Year Average SAIDI ($SAIDI_{\text{Total 5-year Average}}$)**—Includes all customer-minute interruptions that occurred during the current reporting year and the previous four years, except for extreme weather or unusual events[22].

[22] Per the consolidated Docket Number UE-072300 and UG-072301, PSE can petition to exclude certain annual results or outage minutes from the annual performance calculation for the current year and years following that will be affected.

In addition to the SQI $SAIDI_{Total\ 5\text{-}year\ Average}$ measurement, PSE also reports on three additional key measurements:

- **5% Exclusion SAIDI ($SAIDI_{5\%}$) (Non-major-storm SAIDI)**—Excludes customer-minute interruptions during Major Events, where Major Events are defined as days when 5% or more of the electric customer base in a 24-hour period experiences power interruption and the days following (carried-forward days), until all those customers have service restored.
- **Total SAIDI ($SAIDI_{Total}$)**—Includes all customer minute interruptions that occurred during the current reporting year, without exclusion.
- **IEEE SAIDI ($SAIDI_{IEEE}$)**—Measures the number of customer-minute interruptions utilizing the IEEE standard 1366 methodology. Days that exceed the IEEE T_{MED} are excluded. The 2015 T_{MED} is 6.10 minutes—that is, any day that exceeds 6.10 minutes per customer is excluded due to IEEE-defined Major Event Days.

The *About Electric Service Reliability Measurements and Baseline Statistics* section provides more detailed discussion of the four reporting measurements and the establishment of the baseline statistics. Appendix L: *1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements* reports the historical results of the four measurements from 1997 through the current reporting year.

2015 SAIDI Results

The 2015 results based on the recorded outages are reported in Table 3c. PSE missed the benchmark in 2015, driven by two extraordinary wind storms that hit the service territory in August and November.

Throughout 2015, western Washington experienced abnormal to severe drought conditions due to record low snow pack and precipitation levels. As a result of these adverse conditions, trees were stressed and dying in very dry soil conditions. Trees are shallow rooted with the roots spreading wide rather than deep. When soil conditions are too dry to be a counter-balancing weight, strong winds can easily topple trees and loss of limbs occurs more quickly.

On August 29, 2015, PSE's service territory was hit by the strongest summer storm in Northwest history[23]. Winds gusts exceeded 45 mph at Sea-Tac Airport and gusts were much higher in other portions of PSE's service territory. Since it was summer, trees were still fully leafed, and combined with being stressed due to drought conditions, were very vulnerable to these high wind speeds. Trees were uprooted as the dry soil wasn't strong enough to support the trees. Fully leafed limbs were also torn from trees and sailed through the air[24]. The result was an extraordinary storm where over 400,000 customers lost power and it took several days to restore power to everyone.

On November 17th, a second intense storm occurred in our service territory. By late fall of 2015, precipitation was returning to normal levels and the region saw record level precipitation on the weekend preceding the storm

[23] Cliff Mass Weather Blog, "The Strongest Summer Storm In Northwest History", Aug. 31, 2015, http://cliffmass.blogspot.com/2015/08/the-strongest-summer-storm-in-northwest.html
[24] Seattle Times, Sept. 1, 2015, "Crews Scramble as Thousands Still Dark from Storm".

and on the day of the storm. When wind gusts, up to 67 MPH hit the region, the saturated soil could not support the trees' shallow root system causing widespread outages. In addition, some trees were still stressed from the drought earlier in the year and were not strong enough to withstand the high wind speeds.

PSE is petitioning to exclude both of the events from the SQI SAIDI results for 2015. With those events removed, the SQI SAIDI results would be 272 minutes.

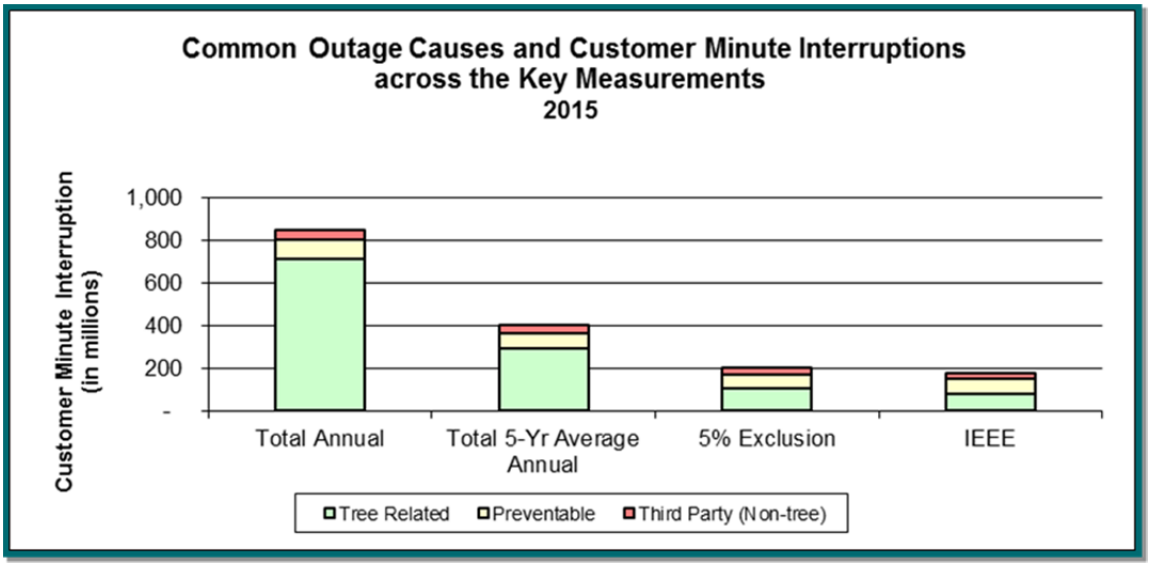
Table 3c: 2015 SAIDI Results

	Key Measurement	Benchmark	Baseline	Current Year Results	Achieved
$SAIDI_{Total}$	**Total (all outages current year) Outage Frequency–System Average Interruption Duration Index (SAIDI)**	**n/a**	**532**	**760**	**--**
$SAIDI_{Total\ 5\text{-}year\ Average}$ **(SQI #3)**	**Total (all outages five-year average) SAIDI**	**No more than 320 minutes per customer per year**	**326**	**361**	
$SAIDI_{5\%}$	**<5% Non-Major-Storm (<5% customers affected) SAIDI**	**n/a**	**132**	**180**	**--**
$SAIDI_{IEEE}$	**IEEE Non-Major-Storm (T_{MED}) SAIDI**	**n/a**	**107**	**163**	**--**

What Influences SAIDI

As noted in the SAIFI section, PSE tracks outages by cause codes and groups the outage causes into three major categories: tree-related, preventable and third party. Figure 3c illustrates the impact of tree-related outages, accounting for 45–85% of customer minutes, across the four key measurements.

Figure 3c: Common Outage Causes and Customer Minute Interruptions across the Key Measurements in 2015



Despite PSE's best efforts to minimize tree-related outages, these outages can greatly influence SAIDI performance. Falling trees can damage the infrastructure and require a specialized tree removal crew to remove fallen trees before field personnel can begin restoration efforts, producing prolonged outages. Tree-related outages have contributed between 55 - 95% to $SAIDI_{Total}$ minutes.

A fallen tree or large limb will damage the line and may also tear down supporting structures, cross arms and poles. The number of trees growing near power lines in the Pacific Northwest is unique among other regions in the United States. Nearly 75% of PSE right-of-way edge is treed. On average there are 1,995 trees per mile on PSE's transmission system. In comparison, National Grid, the second largest utility in the United States representing four states on the East Coast, has 313 trees per mile.[25]

High winds in the fall season increase the risk of tree limb failure in deciduous trees because the trees have not fully shed their leaves. The crown of a tree is less permeable when fully leafed; thus, there is a greater degree of limb breakage due to the "sail" effect. The fully leafed crown acts like a sail, causing a higher degree of wind loading or pressure on branches and limbs and increases the potential for breakage.[26]

Response and Repair Time

Response and repair time also play an important factor to SAIDI. How long it takes to restore service depends on the complexity of the system, the number and types of damaged system components, the extent of the damage, and the location of the problem. The number of outages occurring at one time can also impact the availability of repair personnel to respond, thus adding to outage minutes.

PSE tracks all outage events longer than sixty seconds. The outage length is composed of response, assessment and repair time. Response time, the time from when the customer notifies PSE that an outage has occurred until an EFR personnel arrives at the site of the outage, is measured by SQI #11, Electric Safety Response Time. See *Electric Safety Response Time (SQI #11)* section in Chapter 2 for more detail.

The average response time for 2014 was 53 minutes and 2015 was 54 minutes. The 5% Exclusion Major Events, as well as localized emergency event days, are excluded from this metric.

Response and repair time for service providers are also tracked and measured. Certain outage types, that are beyond the control of the service provider, are either excluded from the metric or adjusted on a case-by-case basis. Examples include access issues and third-party constraints that might limit the service provider's ability to repair the outage in a timely manner. Please see the Service Provider Performance section in Chapter 2 for more detail.

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[25] Ecological Solutions Inc. study, March 3, 2009, page 79 and page 82.

[26] E. Thomas Smiley and Brian Kane, *"The Effects of Pruning Type on Wind Loading of Acer Rubrum," –Arboriculture & Urban Forestry* 32(1): January 2006, pages 33-40, International Society of Arboriculture.

The Electric Safety Response Time metric (SQI #11) and the service provider secondary safety response and restoration time metrics (SP Indices #4B and 4C) are designed to measure specific parts of PSE's outage restoration effort, which should not be compared with any of the SAIDI measures. The three response time metrics track different tasks of restoration and exclude specific outages; therefore they are not comparable to each other.

Outage Data Quality

With the OMS/GIS implementation, PSE anticipated that outage data quality would improve and the reported reliability metrics would increase as a result. The OMS, coupled with geospatial information from the GIS, has the functionality to count all customers affected by an outage as compared to the number reported by CLX. With CLX, the initial number of customers impacted was based on those customers who reported the outage. Experienced outage management personnel could adjust the CLX estimate based on their expertise but nonetheless the number of customers out of service was still an estimated count rather than an exact figure. Because SAIDI is calculated based on the number of customers experiencing outages and the length of outages, with this improved customer count, PSE's SAIDI results have trended upward since implementation without any degradation in reliability. Prior to the implementation of the OMS, PSE used paper maps to correlate the customers who reported the outage with the likely source of the outage. With the OMS, when a customer reports an outage, the customer location is immediately and automatically identified on the OMS electronic network map. The OMS automatically predicts the source of the outage, based upon PSE's prediction rules, so that response personnel can be dispatched to that location. The OMS provides a faster and more precise identification of an outage location than the CLX processes. Finally, since the OMS implementation in 2013, PSE enhanced the business process and is now reviewing all outage data on a daily basis. Therefore the data is more inclusive and accurate compared to CLX based processes.

Historical Trends for SAIDI

Table 3d shows SQI SAIDI from 2011 to 2015.

Table 3d: SQI SAIDI from 2011 to 2015

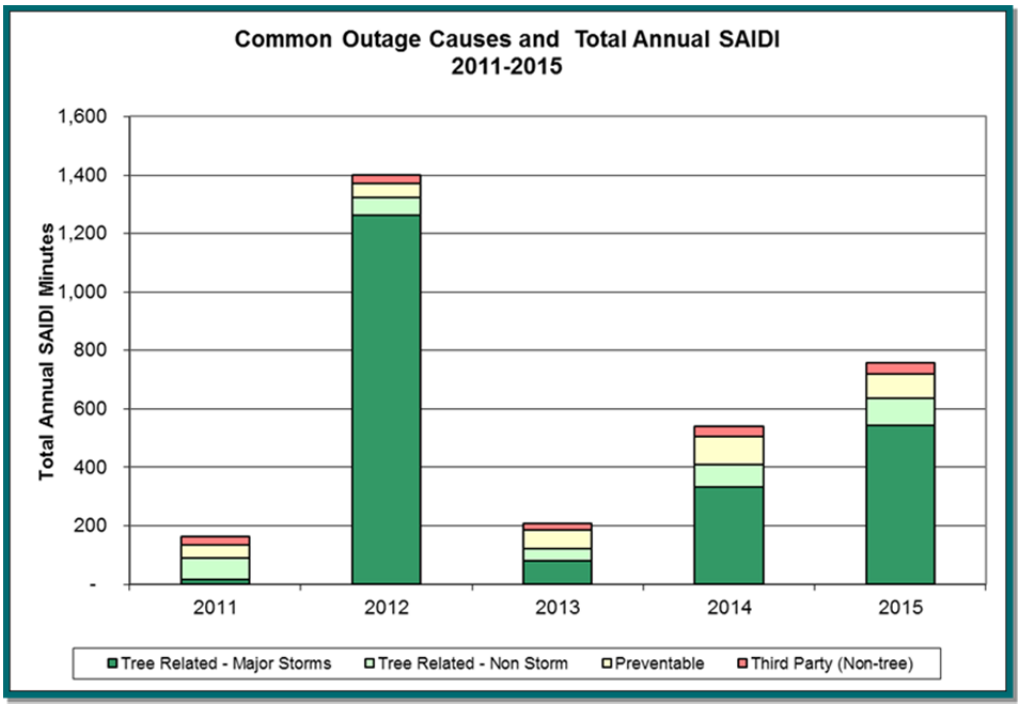
	2011	2012	2013	2014	2015
$SAIDI_{\text{Total 5-year Average}}$ **(SQI #3)**	**281**	**245**	**247**	**312**	**361**
Benchmark	**320 minutes per customer per year, all outage events**				

Appendix L: *1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements* illustrates the comparison between the four SAIDI measurements for 1997-2015. Under the current SQI SAIDI benchmark methodology and requirements, PSE's performance met the annual benchmark for all years except for 2003 and 2015. The 2015 results across all four measurements were higher than previous years. The increase in SAIDI in 2014 and 2015 is due in part to improved outage data quality with the implementation of the OMS/GIS. In the petition to permanently modify the SQI SAIDI mechanics, PSE proposed that pre-2013 $SAIDI_{IEEE}$ data be adjusted by 22% to account for the improved outage data from the OMS/GIS. In addition, with the number of storms in 2015, tree-related outages were also a contributor to the increase in SAIDI.

Figure 12b that follows illustrates the impact of tree-related outages. Tree-related outages account for over 50% of all customer-outage minutes during the last five years, ranging from a high of 95% in 2012 to a low of 55% in 2011. The large swing in minutes reflects the impact of major weather events experienced each year. While PSE makes efforts to reduce tree-related outages through the Vegetation Management and TreeWatch programs, it is not possible to completely eliminate tree-related outages. The *Working to Uphold Reliability* discussion in the *About Electric Service Reliability Measurements and Baseline Statistics* section describes PSE's efforts to manage tree-related outages.

The common outage causes and their impact to $SAIDI_{Total}$ from 2011 to 2015 are summarized in Figure 3d.

Figure 3d: 2011-2015 Common Outage Causes and $SAIDI_{Total}$



Appendix K: *Historical SAIDI and SAIFI by Area* illustrates the 2013–2015 results by county under the four measurements. A summary of Appendix K indicates that 2015 SAIDI performance varied in each county as compared to 2014:

- Kittitas County saw an improvement across all four SAIDI measurements
- Whatcom, Skagit, Island, King, Pierce, and Kitsap Counties saw a decline in performance in one or both of the $SAIDI_{Total}$ and $SAIDI_{Total\ 5\text{-}year\ Average}$ measurements due to the August and November windstorms,
- The decline in King County $SAIDI_{5\%}$ and $SAIDI_{IEEE}$ performance was driven by tree-related outages
- The decline in Kitsap County $SAIDI_{5\%}$ and $SAIDI_{IEEE}$ performance was driven by the tree-related outages and equipment failures

As described more fully in the *Areas of Greatest Concern* discussion in the *About Electric Service Reliability Measurements and Baseline Statistics* section, PSE continues to focus on identifying projects that will affect SAIDI, while managing other aspects of system performance.

About Electric Service Reliability Measurements and Baseline Statistics

Overview

PSE, like most utilities, uses industry standard electric service reliability indices to monitor its annual performance. PSE reports the electric service reliability in four key measurements, which provide a more complete representation of the overall electric customer service reliability. The standard formulas, as noted in the SAIFI and SAIDI chapters, are used to calculate each of the measurements but with one critical difference that showcases a particular area of electric service reliability performance. Each measurement is based on specific criteria:

- **Total Annual**
  - **SAIFI**—Measures all electric customer service interruptions that occurred during a calendar year without any exclusion.
  - **SAIDI**—Measures total number of all electric customer outage minutes in a calendar year without any exclusion.
- **Total 5-Year Average Annual**
  - **SAIFI—**Measures the rolling five-year average of all customer interruptions that occurred during the current reporting year and the previous four years, except for extreme weather or unusual events.
  - **SAIDI—**Measures the rolling five-year average of all customer minute interruptions from the current reporting year and previous four years, except for extreme weather or unusual events.
- **5% Exclusion**
  - **SAIFI**—Measures the annual average number of customer interruptions excluding major outage event days when 5% or more of customers are without power during a 24-hour period and the additional days needed to restore service to all those customers.
  - **SAIDI**—Measures the total annual number of customer outage interruption minutes from the current year excluding major outage event days when 5% or more of customers are without power during a 24-hour period and the additional days needed to restore service to all those customers.
- **IEEE 1366**
  - **SAIFI**—Measures the annual average number of customer interruptions utilizing the IEEE Standard 1366 methodology. Days with daily total SAIDI that exceed the IEEE T_{MED} threshold value are excluded.
  - **SAIDI**—Measures number of customer-minute interruptions utilizing the IEEE Standard 1366 methodology. Daily SAIDI results that exceed the IEEE T_{MED} threshold value are excluded.

The formula for calculating each of these measurements can be found in Appendix H: *Terms and Definitions*.

Baseline Year

To meet UTC requirements, PSE established 2003 as its baseline year. While meeting the requirements, PSE would prefer to develop a baseline using multiple years, which mitigates the fluctuation of reliability statistics and proves more useful in trend analysis. In addition, with the implementation of the OMS/GIS, PSE's SAIDI and SAIFI results have seen an increase due to the improved outage data integrity, without degradation to reliability. PSE cautions against the attempt to use a single year's system performance data or information to assess year-to-year trends. Such trend analysis may prove inconclusive, and PSE believes that there is limited usefulness in designating one specific year's information as a "baseline." As a result, comparing current year results to a baseline year that was established based on different outage data collection methods is not meaningful.

Major Events

In 2015, PSE experienced the following major storm events that met the 5% SQI exclusion or the IEEE exclusion criteria:

- A January storm event that affected customers in northern King, Kitsap Counties and Vashon Island
- An August storm event that affected customers across PSE's entire service territory
- An October storm event that affected customers in King, Pierce, Kitsap Counties and Vashon Island
- A November storm event that affected customers across PSE's entire service territory
- A second November storm event that affected customers in Kitsap County and Vashon Island
- A December storm event that affected customers in Whatcom, Skagit, Island, and Thurston Counties
- A second December storm event that affected customers in King, Pierce, Thurston, Kitsap Counties and Vashon Island

Table 13a details the dates, causes and exclusion criteria for the IEEE and 5% exclusion events in 2015. Typically, an event that meets the 5% Exclusion Major Event Day criteria will also exceed the IEEE T_{MED} criteria. Since the initial reporting of the IEEE methodology in 2003, all 5% Exclusion Major Event Days have met the IEEE T_{MED} criteria.

IEEE T_{MED} is based on the customer minutes rather than the number of customers impacted. Therefore, if PSE experiences a storm event that is isolated to a small geographic area or a less populated county, it is possible that events exceed the IEEE T_{MED} but not meet the 5% exclusion criteria. There have been 34 such events since PSE started reporting IEEE statistics in 2003. In 2015, the five of the ten IEEE T_{MED} events also met the 5% Exclusion Major Event Day criteria.

Table 3e: 2015 Comparison Between IEEE 1366 and 5% SQI Exclusion Methods

IEEE TMED Exclusion Date	Daily SAIDI	5% Customers Out Exclusion	Cause	Span of 5% Customers Out Exclusion Period
1/18/2015	26.30	9.3%	Wind	1/18/2015 1:00 AM - 1/21/2015 9:00 PM
8/29/2015	223.42	33.1%	Wind	8/29/2015 8:00 AM - 9/4/2015 3:00 PM
8/30/2015	16.71			
10/10/2015	11.17	n/a	Wind	n/a
11/17/2015	198.23	32.2%	Wind	11/17/2015 9:00 AM - 11/21/2015 7:00 PM
11/18/2015	15.36			
11/24/2015	44.49	8.9%	Wind	11/24/2015 11:00 AM - 11/26/2015 10:00 PM
12/6/2015	8.18	n/a	Wind	n/a
12/9/2015	45.99	10.7%	Wind, Rain, Lightning	12/9/2015 1:30 AM - 12/12/2015 11:00 PM
12/10/2015	9.98			

Table 3f details the 2011 through 2015 IEEE T_{MED} values, number of IEEE exclusion dates, number of 5% SQI exclusion events and number of 5% SQI exclusion event days.

Table 3f: 2011 to 2015 Comparison of IEEE 1366 and 5% SQI Exclusion Events

	2011	2012	2013	2014	2015
IEEE T_{MED}	**7.68**	**5.38**	**5.62**	**5.60**	**6.10**
Number of IEEE Major Event Days	**1**	**10**	**3**	**12**	**10**
Number of 5% SQI Exclusion Major Events	**1**	**1**	**3**	**6**	**5**
Number of 5% SQI Exclusion Major Event Days	**2**	**11**	**7**	**22**	**18**

Areas of Greatest Concern

The regional area planners study "area-of-concern" circuits and propose projects that will improve the reliability for customers being served by those circuits. These areas of greatest concern provide focus for the planner in developing electric system improvement projects; however, all areas are continually evaluated for electric service reliability improvement. To assist with identifying the highest priority projects for reliability, PSE focuses on the

Top 50 worst-performing distribution circuits over the past five years that consistently contributed the most customer-minute interruptions.

Each circuit is ranked by the total customer-minute interruptions seen by the circuit for each of the previous five years. The Top 50 worst-performing distribution circuits are the circuits with the highest ranking. The percentage contribution of the Top 50 worst-performing distribution circuits towards the total distribution of customer-minute interruptions continues to decrease slightly, indicating that the system projects previously completed on the circuits has improved reliability. Over the past five years, PSE spent on average $66 million per year on planned distribution reliability projects.

Based upon reviewing the outage history, number of customers impacted, outage location and other factors, planners propose projects that are designed to improve reliability on these circuits. Appendix N: *Areas of Greatest Concern with Action Plan* details the Year End 2015 and Year End 2014 annual ranking of the Top 50 worst-performing distribution circuits along with PSE's completed or future plan for system improvements on each circuit. Comparing the Year End 2015 Top 50 worst-performing distribution circuits to the Year End 2014 Top 50 worst-performing distribution circuits, there was a turnover of 13 circuits and 37 remained on the list from the previous year. Since annual outage data for the year is not typically finalized until the following mid-February, the planners identify and develop projects throughout the year. Some projects are approved and released throughout the year, and some may be identified for the following budget year. While PSE funds projects to improve the reliability on the Top 50 worst-performing distribution circuits, some of the circuits will remain on the list year after year. For those circuits, it is cost-prohibitive to sufficiently resolve the reliability issues for the circuit to drop off the annual list.

In addition, PSE also evaluates the 50 worst-performing distribution circuits based on "circuit SAIDI." Circuit SAIDI measures the performance of individual circuits as experienced by the customers on those circuits. This tends to be a more customer-centric view because customer density on the circuit has less influence on the measure.

For the four regional areas in PSE's service territory—Whatcom/Skagit/Island, North King County, South King County, Pierce/Thurston/Kitsap—the regional planning team reviews the performance of the distribution system. Each team reviews the 50 worst-performing distribution circuits in their regions in proposing reliability projects for the upcoming year. These projects are evaluated against other system-related projects for funding. The system planning process used by the planners to have their proposed projects considered for funding is described below.

The goal of the planning process is to determine cost-effective ways to meet customer needs and maximize value to the company, customers and community. The system planning process begins with an analysis of the current situation and an understanding of the existing operational and reliability challenges. Planning considerations include internal inputs such as reliability indices, company goals and commitments, and reviewing the root causes of the historic outages. In addition, external inputs such as regulations, municipalities' infrastructure plans, and customer complaints of service issues are also considered.

These inputs assist in determining specific solutions and alternatives to address the overall system reliability. Each proposed project alternative is evaluated with quantitative benefits such as number of outages and outage duration, number of customers impacted, and qualitative benefits such as improving customer satisfaction and reducing customer complaints. Each proposed project alternative is compared using a value modeling tool that involves building a hierarchy of the value these benefits against the project cost. Total value is optimized across the entire portfolio of electric and natural gas system infrastructure projects, which results in a set of capital projects that provide maximum value to PSE customers.

In addition to the annual process as described above, new system planning projects are identified throughout the year. These projects can be a result of a new initiative such as a new reliability program, a municipality altering its infrastructure plans, new system performance issues or addressing a resource need for a given area. PSE also identifies and implements projects throughout the year to address emergency repairs and replacements that emerge.

Customer Electric Reliability Complaints

Customer inquiries and complaints about electric reliability and power quality are additional indices that measure PSE's success in delivering safe and reliable electric service. When two or more customer inquiries on outage frequency or duration and/or power quality have been recorded from the same customer, during the current and prior reporting year, PSE considers this combination as a complaint.

For the four years from 2010 through 2013, PSE experienced a decrease in the number of complaints received either by PSE or the UTC. However, in 2014 and 2015, PSE had an increase in both complaint categories, which might be attributed to the severity and frequency of storm events. Also, an improvement in the data collection method and business processes for customer inquiries could have resulted in an increase in the number of reported PSE complaints. In 2015, PSE also noticed an increase in UTC complaints after the UTC's ad campaign encouraging the public to reach out to them was initiated.

During the rolling two-year period of 2014–2015, PSE received complaints from 49 customers relating to reliability and power quality concerns. PSE's complaint process and the change in data collection is described in Appendix I: *Electric Reliability Data Collection Process and Calculations* and are shown in tabular form in Appendix M: *Current-Year Commission and Rolling-Two-Year PSE Customer Electric Service Reliability Complaints with Resolutions.*

In 2015, the UTC received 27 complaints relating to PSE's electric service quality. These complaints are shown in Appendix M: *Current-Year Commission and Rolling-Two-Year PSE Customer Electric Service Reliability Complaints with Resolutions.*

PSE investigates these customer inquiries and UTC complaints, and tracks service issues. Customers receive follow-up correspondence to discuss their concern, as well as plans for resolution. The outage history surrounding each of these customer inquiries and complaint is reviewed for the overall circuit reliability and then an appropriate plan for resolution is prepared.

Depending on the nature of the circuit reliability, the plan for resolution could be continued monitoring of the circuit. Or a system planner may propose projects which will improve the circuit reliability. The map in Appendix O: *Current Year Geographic Location of Electric Service Reliability Customer Complaints on Service Territory Map with Number of Next Year's Proposed Projects and Vegetation-Management Mileage* summarizes the number of complaints by county for 2015.

Working to Uphold Reliability

To continually improve and provide reliable electric service throughout its service area, PSE reviews the cause of outages to better understand performance at the subsystem level. Appendix J: *Current Year Electric Service Outage by Cause by Area* details the recorded outage causes in each county in 2015. It shows that trees (TF, TO, TV), birds and animals (BA) and equipment failures (EF) continue to be the primary reasons for outages in 2015 as in previous years. Scheduled outages (SO), for the purpose of performing system upgrades and maintenance, also contribute a significant number of outages. The duration of the scheduled outages is minimized to lessen the effect on customers. This section discusses the efforts PSE takes to reduce the number and the overall duration of tree-related and preventable outages.

The map in Appendix O: *Current Year Geographic Location of Electric Service Reliability Customer Complaints on Service Territory Map with Number of Next Year's Proposed Projects and Vegetation-Management Mileage* shows the number of reliability projects and vegetation mileage by county PSE has proposed for completion in 2016.

Vegetation Management

Outages related to trees and vegetation continue to be a major factor in the SAIDI and SAIFI performance. Trees remain a vital element of the region's quality of life, but they are also a major cause of power outages. To mitigate trees and limbs falling into electric power lines, PSE performs vegetation maintenance based on a cyclical schedule. The maintenance programs focus on achieving a safe and reliable electric system. Vegetation Management involves a variety of practices and techniques designed to keep trees and limbs from coming in contact with power lines and causing outages. Less than 10% of tree-related outages are caused by tree growth, illustrating an effective vegetation management program[27].

[27] Ecological Solutions Inc., study, October 2008, page 39.

Cyclical Programs

PSE spends more than $13 million annually on a systematic, cyclical vegetation management program to reduce outages in its overhead electric distribution, high-voltage distribution and transmission systems.

- **Overhead distribution system**—Usually trees are trimmed every four years for distribution lines in urban areas and every six years for lines in rural areas.
  - Danger trees, trees that are an imminent threat of falling into power lines, are removed in these rights-of-way or within 12 feet of the system at the same time that trees are trimmed.
  - In 2015, PSE completed 681 miles of vegetation management. The maintenance cycle is on schedule.
- **High-voltage distribution system and cross-country transmission corridor system**—Trees are trimmed every three years on PSE's high-voltage distribution rights-of-way and annually in transmission corridors. Spray and mowing activities are performed and danger trees are removed along the edge of these corridors, typically within 12 feet of the system at the same time trees are trimmed. In 2015:
  - 585 miles of high-voltage distribution lines were maintained.
  - 375 miles of transmission corridors were maintained under federal clearing requirements.
- **Fast growing, undesirable species**—Hot spotting and mid-cycle work and patrols occur yearly on the overhead distribution, high-voltage distribution and the transmission corridors to remove fast-growing, undesirable species of trees.
  - In 2015, roughly 300 miles were treated for undesirable trees.

TreeWatch Program

PSE also manages vegetation impacts and spends $2 million annually with its TreeWatch program. Within this program, certified arborists work with communities and property owners to identify and remove "at-risk" trees on private property that are more than 12 feet away from power lines located beyond the limits of normal cyclical vegetation management standards. In 2015, the TreeWatch program addressed approximately 300 miles of transmission and high-voltage distribution lines and over 500 miles of distribution lines. Nearly 25,000 trees were removed or pruned. The trim and removal numbers vary year to year due to the size and complexity of the trees targeted to be trimmed and removed. The focus in 2015 was on critical high voltage distribution lines, and those distribution circuits that are on the top 50 worst circuits for tree-related outages.

Tree Replanting Program

PSE devotes about $500,000 each year to replanting trees and non-construction related mitigation in PSE's service area. In addition, PSE developed and makes available to customers a vegetation planning handbook called *Energy Landscaping*. The handbook helps customers evaluate landscaping opportunities and is a how-to for planting trees and shrubs and tree-care solutions. It also lists recommended trees and shrubs to plant near power lines.

Distribution, High-Voltage Distribution and Transmission Vegetation-Management Study

A vegetation management study was conducted on PSE's overhead transmission system by Ecological Solutions, Inc. The results[28] validate that PSE's pruning maintenance cycles are appropriate for the local tree growth rates. Additionally, the study illustrates that trees growing off the right-of-way are increasingly contributing to transmission system outages. The study concluded that 80% of tree-related outages are caused by trees from outside the right-of-way and 68% of trees that fail and cause outages are healthy trees. For 2015, the percentage of outages caused by healthy trees may be lower as severe drought conditions in 2015 compromised the structural integrity of some of the trees.

The study further suggests that outages caused by healthy trees can only be addressed by reducing the electric system's exposure to trees, which based upon species and quantities in PSE's electric service territory may be impractical.

The study also revealed that one-third of all tree-related outages are due to limbs falling on lines. A tree with branches overhanging a power line is twice as likely to cause an outage as a tree that had its overhanging branches removed. The study recommended that all branches overhanging power lines be removed (sometimes referred to as 'lines to sky trimming'), resulting in a reduction of tree-related outages.

In 2012, PSE initiated a pilot project to test the recommendation. The circuit chosen is one of the least reliable circuits in the PSE service territory, Chico-12, which is located in Kitsap County. Customers in the area are served by a 54-mile-long power line that runs through dense forested areas. The length of the line and the high number of nearby trees is a combination ripe for tree-related outages—the more miles of power line, the more area of exposure to trees and tree branches. The concept of the pilot is simple: by removing tree branches that overhang power lines, the probability of tree branches falling into or coming in contact with power lines will decrease, as well as any associated power outages. The tree work was completed in the fall of 2012. Results indicate that the circuit experienced fewer non-Major Event outages per year after trimming than occurred prior to the trimming. There was an average of 42 non-Major Event outages per year from 2010-2012 versus an average of 26 non-Major Event outages per year from 2013-2015. PSE will continue to monitor Chico-12 reliability, but it appears that trimming was effective in reducing non-Major Event outages.

In 2013, PSE initiated an additional pilot project similar to the Chico-12 project. The circuit selected was Duvall-15 located in east King County. Although tree-related circuit outages on Duvall-15 were significantly less than Chico-12, PSE selected the circuit because the vegetation component was significantly different than Chico-12. Chico-12 vegetation was primarily evergreen or conifer forest edge. Duvall-15 was a mix of both evergreen and deciduous trees. Initial results indicate that Duvall-15 also experienced fewer non-Major Event outages per year after trimming than occurred prior to trimming: the 2010-2013 average was eight non-Major Event outages per year versus four non-Major Event outages per year from 2014-2015. PSE will continue to monitor Duvall-15 reliability and report more definitive results next year.

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[28] Ecological Solutions Inc. study, March 2009, page 12 and page 71.

In 2014, PSE initiated an outage reduction program that focuses on removing overhanging limbs and selective removal of danger trees on the top 50 worst performing circuits. This effort was combined with circuits scheduled for maintenance.

Substation Landscape Renovation

In 2015, substation landscape renovation projects at the Anacortes and Northup substations were completed to improve reliability. At the Anacortes substation, following an outage caused by a tree during the August storm, community concerns were raised regarding the placement of large maturing tree species on the substation property. With the support of local government and community, oak trees surrounding the substation were removed and replaced with utility-friendly trees. These trees provide screening of the substation without unnecessary risk to the equipment. This also provides a demonstration of tree species appropriate for planting near power lines.

In Bellevue, at the Northup substation, at-risk Douglas fir trees were removed and replaced with low-growing screening trees.

Targeted Reliability Improvements

Along with vegetation management to minimize tree-related outages, PSE has implemented other programs to reduce the frequency and duration of outages on the transmission and distribution systems, with a particular focus on improving the reliability on the Top 50 worst-performing distribution circuits. These programs include replacing existing overhead distribution wire with tree wire to prevent tree limb outages, installing more sectionalizing devices (some which are remotely monitored and control), replacing aging infrastructure, installing covered wire and devices to prevent animal-related outages and maintaining key equipment in substations.

Tree Wire

PSE works to reduce outages by installing 'tree wire', which is a tough, thick-coated power line capable of withstanding contact with tree branches that would otherwise cause an outage. The vast majority of tree wire is installed at locations where there has been a previous five year history of outages related to tree branches and a field assessment confirms that installing tree wire would reduce the likelihood of outages. In 2015, over 70 distribution circuit miles of tree wire was installed, a 32% increase over 2014.

Distribution Sectionalizing Devices

In 2008, a high-level roadmap was developed to improve reliability and identify cost-effective tactics for planning consideration. One effective tactic is the installation of reclosers. These devices are an improvement over conventional fuses. With a conventional fuse, a temporary fault, typically a branch brushing against the power line, which causes the fuse to blow open and de-energize the line. Service is not restored until EFR personnel patrols the line and manually replaces the blown fuse using a bucket truck.

In comparison, reclosers sense the fault on the power line and automatically attempt to re-energize the line. If the recloser no longer senses the fault, it will reclose and re-energize the line. If the fault is not temporary, the

recloser can isolate the damaged section of the line and customers upstream from the recloser do not experience an outage. Another effective tactic implemented is the installation of gang-operated switches. Gang-operated switches provide the ability to simultaneously disconnect the three-phase lines rather than disconnecting one phase at a time, and to better isolate damaged infrastructure so more customers can continue to be served.

In 2015, 40 additional line reclosers and eight gang-operated disconnect switches were installed. Presently, there are 13 line reclosers installed with remote monitoring and control, and PSE is evaluating locations where it would provide significant benefit to install more in the future.

Substation Maintenance

Substations are the key hubs connecting high-voltage power lines and the electric distribution power lines that serve customers. Substations typically serve between 500 and 5,000 customers and contain major pieces of equipment, technologies to monitor and operate the system, and backup systems. Substations are inspected monthly and maintenance programs are in place to ensure performance and efficiently maintain expensive equipment.

As PSE continues adding more infrastructure, reliability measures are incorporated into the design. For example, building a substation requires the installation of the transmission and distribution lines; to enhance reliability and operational flexibility, the power lines typically connect to adjacent substations. New substations enable the operational ability to shift customers to the neighboring substations during an outage.

SCADA

Supervisory Control and Data Acquisition (SCADA) is an important aspect of managing the power system. SCADA is a system used for monitoring and controlling substation equipment that will enable faster restoration of power to the customers. At the end of 2015, there were six stations left to add or upgrade SCADA.

Bellevue Central Business District (CBD) SCADA project

The electric distribution system serving the City of Bellevue's Central Business District (CBD) is very dense. When an outage occurs, it takes time to access switches in parking garages and/or sidewalks within the downtown core to identify, isolate and restore power to the high-rise buildings. In a review of how other utilities serve similar loads, there is an indication that for urban areas, manual restoration should be replaced with SCADA switchgear that can be remotely monitored and controlled to reduce the outage impact and to manage the system. By the end of 2015, PSE had 24 SCADA switches installed in the CBD. All except one is operational in the Energy Management System (EMS). PSE is planning to install 66 units in total. It is expected that many of the feeders in the distribution system serving the Bellevue CBD area will be ready for distribution automation within the next five years.

Pilot Projects

In addition to the ongoing Targeted Reliability Improvement Programs, PSE has implemented three pilot projects in 2015 to test improvement in reliability.

Tripsavers

This project is to replace 250 100T overhead fuses with tripsavers which are single-phase reclosing devices. The tripsavers will help reduce temporary outages related to tree limbs and animal contact similar to a recloser but at a reduced cost. In the 2014 pilot program, the 19 installed tripsavers prevented 5 outages, which would have lasted about 120 minutes each. Based upon the pilot results, PSE expects the 250 tripsavers could prevent 66 outages.

Exacter

The intent of this project is to proactively identify and replace overhead equipment before it fails, thus eliminating outages to customers. Exacter technology identifies equipment where partial discharge or electromagnetic interference is present which indicates that the equipment is approaching failure. In 2015, the seventy worst performing distribution circuits with overhead equipment outages were evaluated using this technology. Over 378 overhead circuit miles were scanned and 55 pieces of equipment were identified with electromagnetic interference signatures. PSE identified 38 of the 55 devices to replace. The remaining 17 devices served looped transmission lines, which if a failure occurred on the device, the line could easily be switched around during the repair without customer impact. After the 38 pieces of equipment are replaced, PSE will monitor the overhead equipment outages on those circuits to determine if those circuits will see a reduction in overhead equipment outages due to this pilot.

Tollgrade Sensor

This project involves installing 51 Tollgrade Lighthouse sensors on the three worst performing circuits (Chico-12, Baker River Switch-24, and Cottage Brook-13). The sensors will help improve reliability due to immediate notification if a fault is beyond the switch, and find potential problems on the line that may cause momentary or permanent outages. The sensors will also help diagnose the pattern of events prior to customer complaints, and help identify failing or mis-operating equipment.

Aging Infrastructure

Cable Remediation

For an underground power-distribution system, age and moisture make buried cable vulnerable to failures and prolonged outages. Since 1989, PSE has managed a cable remediation program that considers two remediation options: silicone injection or cable replacement.

- Silicone injection extends the life of underground power cable for 20 years by restoring the cable's insulating properties.
- Cable replacement has an expected life that exceeds 30 years.

In 2015, 70 miles of cable was remediated.

Pole Test and Treat and Replacement Programs

In an overhead electric system, the failure of a utility pole can cause an outage that could affect thousands of customers. In 2015, there were 69 outages caused by a structural failure on the pole. To minimize the risk of such a large outage, PSE has a pole inspection and replacement program for both transmission and distribution wood poles.

PSE assesses each pole's condition by excavating around the base to determine the extent of below-ground decay and by boring into the pole to assess decay within the pole. The remaining strength of the pole is calculated based on the measurements of decay. Poles with remaining strength that still meets the National Electric Safety Code (NESC) guidelines are treated with an internal fumigant, which extends its serviceable life. Poles not meeting NESC guidelines are scheduled for replacement.

Industry data shows that the average serviceable life of a pole in the Pacific Northwest without remedial treatment is 43 years. Poles which have received routine treatment throughout their life last significantly longer. Industry data suggests the average life could be 100 years or more.

In 2015, 10,301 poles were inspected and treated (7,268 distribution poles and 3,033 transmission poles) and 1,252 poles were replaced (1,179 distribution poles and 73 transmission poles). In addition to the programmatic investment in pole replacement, PSE also replaces poles identified as near failure during the year and in storm restoration efforts.

Aging Overhead Infrastructure

Many of the tree-related outages result from the failure of smaller diameter aging overhead wires, such as copper primary and open-wire secondary. These smaller wires break due to the impact of the failing branches, leading to longer customer outages. PSE is replacing these smaller aging wires with larger steel-reinforced stranded-aluminum wires, per current standards, that will better withstand the impact of falling branches. The larger wires will improve reliability and enable more customers to be served in the future. In 2015, seven circuit miles of smaller diameter wire was replaced.

Substation Equipment Replacement Programs

Upgrades to the substations and equipment are important strategies for reliability. Specific types of equipment are proactively replaced under replacement programs to maintain system reliability, reduce operational costs and offset impacts from aging infrastructure. In 2015, five transmission breakers, nine distribution breakers and seven relay packages were replaced. Additionally, three transformer protection devices, three circuit switchers, thirteen station batteries and two spill prevention, control, and countermeasures were completed under these programs.

Wildlife

In 2015, there were 1,998 bird and animal-caused outages. This was a significant increase from recent years, primarily driven by the mild spring which resulted in a higher nesting success rate of small animals and birds. Despite the sharp increase in animal-caused outages in 2015, over the last 5 years, animal-caused outages have been trending downward. From 2011 to 2014 PSE averaged 1,400 animal-caused outages per year.

In early 2000, PSE modified its construction standards to reduce the risk of animal-related outages. Today, in an effort to avoid bird and animal-caused outages, equipment poles are upgraded with bushing covers, cutout covers and covered jumpers when maintenance activities are performed. In 2015, 1,135 bushing covers were installed on distribution transformers. In addition, new transformers and other electrical equipment come equipped with bushing covers. New electric infrastructure projects that are located within avian-designated safe habitats are constructed to avian-safe standards.

PSE's Avian Protection Program tracks all avian-related outages and retrofits mortality sites using avian protection products and techniques to reduce the risk of repeat outages and avian mortality. The program evaluates circuits that are identified as higher risk for an avian-related outage or mortality and proactively installs avian protection where appropriate to prevent avian mortality and outages. In 2015, the PSE Avian Protection Program completed 26 avian protection retrofit projects for a total of 131 poles and spans that are now avian-safe. These projects were completed in response to over 181 bird mortalities, including 7 eagles, 51 swans and 14 raptors.

Third-Party Outages

When a vehicle hits a utility pole, some customers will likely lose power. As part of an ongoing effort to prevent outages and improve motor vehicle safety, PSE planners review the location of the poles whenever a car-pole incident causes an outage. The pole may be relocated if the pole is likely to be hit again.

In addition, PSE continues to work toward preventing third party damage to the underground electric distribution system. Prior to excavating, customers and builders are encouraged to request locates of underground power lines in order to prevent accidental contact. The accidental contact could lead to customer outages.

Planned Outages

Planned outages, typically for connecting new or upgrading existing infrastructure, are the fourth leading cause and account for 12% of recorded non-Major Event service interruptions in 2015. In many cases, service must be interrupted to safely connect new power lines or replace aging or damaged infrastructure. As additional improvements are made, more planned outages may be necessary.

The recording of all planned outages and the associated outage data accuracy continues to be an area of focus. The OMS interface improvements and increased the OMS user proficiency has improved the data accuracy associated with planned outages. PSE is making an ongoing effort to review outage communication processes

between the service crews and system operations to ensure that planned outage changes are recorded into the OMS. PSE continues to make improvements in recording planned outages that do not require system switching oversight although a small portion of these outages remain unrecorded. The total impact of these unrecorded planned outages to SAIDI and SAIFI is very low as this type of outage impacts very few customers for a short duration.

PSE is continuing to work through a business process to ensure accurate recording of all planned outages.

Going Forward

In 2016, PSE will continue its programs as described earlier. Specifically:

- **Areas of Greatest Concern**
  - Continue to monitor the performance of the Top 50 worst-performing circuits as outlined in the *Areas of Greatest Concern* section of this chapter and implement value-added projects to improve the reliability of these circuits. Appendix N: *Areas of Greatest Concern with Action Plan* provide specific plans for system improvements on each circuit.

- **Vegetation Management**
  - Continue cycle maintenance to remain on cycle. Remove or prune between 14,000 and 15,000 off-right-of-way trees under the TreeWatch program, again focusing on PSE's critical high voltage distribution lines, the worst performing distribution circuits, and transmission lines.
  - Continue the outage reduction plan and complete over 500 miles of distribution on the Top 50 worst circuits that are scheduled for maintenance.
  - Proceed with two substation renovation projects.

- **Targeted Reliability Improvements**
  - **Targeted Reliability Programs**—Continue to install covered conductor (tree wire) to prevent tree-limb outages and convert overhead lines to underground. Replace failing poles and install animal guards as appropriate in these projects. This has a secondary benefit of preventing outages caused by wildlife.
  - **Distribution Sectionalizing Devices**—Continue to install additional sectionalizing devices on the distribution system to help minimize outages and outage times. These devices include reclosers, switches and fuses. PSE will continue to evaluate the merits of implementing remote monitoring and control at additional locations.
  - **SCADA**—Continue to install SCADA in the distribution substations based on specific benefit and cost. Also, PSE will be installing supervisory control of the feeder breakers and ampere readings on three-phase breakers at critical distribution substations.
  - **Bellevue Central Business District (CBD) SCADA**—Continue efforts to build the foundation for automation of the distribution system serving the Bellevue CBD and help reduce outage duration.
  - **Pilot Projects**—
    - **Tripsavers**—Continue to replace 100T fuses with tripsavers.

        - **Exacter**—Replace the equipment that has been identified as nearing failure and monitor the overhead equipment outages on those circuits.
        - **Tollgrade Sensor**—Install the sensors on the three worst performing circuits and monitor performance.
    - **Aging Infrastructure**—Continue aging infrastructure programs such as cable remediation, smaller overhead wires and pole replacement.

- **Wildlife—**Re-emphasize, to EFR servicemen, the need to retrofit overhead equipment with appropriate animal protection equipment when responding to bird and animal-caused outages.
- **Third Party –** Increase the level of oversight on contractors excavating around both gas and electric lines with a pilot program beginning in the second quarter of 2016. A damage prevention representative will make unannounced visits to construction sites to educate contractors about the dig law, help them develop damage prevention plans, monitor their digging practices, and enforce the dig law requirement to obtain locates.

Appendices

This section contains the following appendices:

- A: Monthly SQI Performance
  - *Table A3: Attachment A to Appendix A—Major Event and Localized Emergency Event Days (Affected Local Areas Only)*
  - *Attachment B to Appendix A—Major Event and Localized Emergency Event Days (Non Affected Local Areas Only)*
  - *Table A5: Attachment C to Appendix A—Natural Gas Reportable Incidents and Control Time*
- B: Certification of Survey Results
- C: Penalty Calculation
- D: Proposed Customer Notice (Report Card)
- E: Disconnection Results
- F: Customer Service Guarantee Performance Detail
- G: Customer Awareness of Customer Service Guarantee
- H: Electric Reliability Terms and Definitions
- I: Electric Reliability Data Collection Process and Calculations
- J: Current Year Electric Service Outage by Cause by Area
- K: Historical SAIDI and SAIFI by Area
- L: 1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements
- M: Current-Year Commission and Rolling Two-Year PSE Customer Electric Service Reliability Complaints with Resolutions
- N: Areas of Greatest Concern with Action Plan
- O: Current Year Geographic Location of Electric Service Reliability Customer Complaints on Service Territory Map with Number of Next Year's Proposed Projects and Vegetation-Management Mileage

A
Monthly SQI Performance

Appendix A consists of Tables A1 and A2 that provide monthly details on the nine service quality indices.

It also contains the following attachments:

Attachment A to Appendix A—Major Event and Localized Emergency Event Days (Affected Local Areas Only)

Attachment B to Appendix A—Major Event and Localized Emergency Event Days (Non-Affected Local Areas Only)

Attachment C to Appendix A—Gas Reportable Incident and Control Time

Table A1: PSE Monthly SQI Performance

Category of Service	SQI No.	Description	Annual Benchmark	Jan 2015	Feb 2015	Mar 2015	Apr 2015	May 2015	Jun 2015	Jul 2015	Aug 2015	Sep 2015	Oct 2015	Nov 2015	Dec 2015
Customer Satisfaction	2	WUTC Complaint Ratio	0.40 complaints per 1000 customers, including all complaints filed with WUTC	0.012	0.017	0.014	0.021	0.019	0.024	0.023	0.021	0.033	0.014	0.019	0.019
	6	Customer Access Center Transactions Customer Satisfaction	90% satisfied (rating of 5 or higher on a 7-point scale)	94%	92%	92%	94%	95%	96%	97%	91%	93%	95%	93%	94%
	8	Field Service Operations Transactions Customer Satisfaction	90% satisfied (rating of 5 or higher on a 7-point scale)	97%	95%	95%	97%	94%	98%	98%	98%	96%	98%	97%	93%
Customer Services	5	Customer Access Center Answering Performance[29]	75% of calls answered by a live representative within 30 seconds of request to speak with live operator	81%	83%	82%	70%	59%	54%	32%	39%	72%	88%	86%	90%
Operations Services	4	SAIFI	1.30 interruptions per year per customer	0.040	0.080	0.070	0.050	0.070	0.070	0.090	0.120	0.090	0.160	0.120	0.150
	3	SAIDI	320 minutes per customer per year	32	11	11	5	7	9	13	257	13	28	277	97
	7	Gas Safety Response Time	Average of 55 minutes from customer call to arrival of field technician	31	28	28	28	29	29	29	29	30	29	32	30
	10	Kept Appointments[30]	92% of appointments kept	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	11	Electric Safety Response Time	Average of 55 minutes from customer call to arrival of field technician	54	47	48	49	52	52	52	55	55	52	65	69

[29] Results shown exclude calls abandoned within 30 seconds, which had been included in the calculation for SQI reporting years 2009 and prior. The change was proposed in PSE's 2009 SQI annual report and agreed to by UTC staff and Public Counsel via their e-mails to PSE on April 1, 2010.

[30] Results shown are rounded to the nearest whole percentage per UTC order. However, these 100% monthly performance results do not reflect that PSE met all its appointments during the reporting period. Numbers of missed appointments by appointment type are detailed in Appendix F: Customer Service Guarantee Performance Detail.

Table A2: Service Providers Monthly Service Quality Performance

Category of Service	Index	Service Provider	Annual Benchmark Description	Jan 2015	Feb 2015	Mar 2015	Apr 2015	May 2015	Jun 2015	Jul 2015	Aug 2015	Sep 2015	Oct 2015	Nov 2015	Dec 2015
Operations Services	Service Provider New Customer Construction Appointments Kept[31]	Quanta Electric	At least 92% of appointments kept	100%	100%	100%	99%	99%	99%	99%	100%	99%	99%	99%	99%
		Quanta Gas	At least 92% of appointments kept	99%	99%	99%	97%	99%	98%	98%	99%	99%	98%	99%	100%
	Service Provider Standards Compliance	Quanta Electric	At least 97% compliance with site audit checklist points[e]	99%	98%	99%	99%	100%	99%	100%	99%	100%	100%	99%	100%
		Quanta Gas	At least 97% compliance with site audit checklist points	99%	98%	98%	100%	99%	99%	100%	99%	99%	99%	100%	100%
	Secondary Safety Response and Restoration Time Core Hour	Quanta Electric	Within 250 minutes from the dispatch time to the restoration of non-emergency outage during core hours	263	259	253	252	252	253	253	255	257	256	258	258
	Secondary Safety Response and Restoration Time Non-Core Hour	Quanta Electric	Within 316 minutes from the dispatch time to the restoration of non-emergency outage during non-core hours	288	292	289	291	287	290	291	291	293	294	296	297
	Secondary Safety Response Time	Quanta Gas	Within 60 minutes from first response assessment completion to second response arrival	45	38	41	46	43	46	43	54	36	42	66	45

[31] Results shown are rounded to the nearest whole percentage per UTC order. However, these 100% monthly performance results do not reflect that service providers met all the appointments during the reporting period. Numbers of missed appointments by appointment type are detailed in Appendix F: Customer Service Guarantee Performance Detail under the Permanent Service appointment type.

Table A3: Attachment A to Appendix A—Major Event and Localized Emergency Event Days (Affected Local Areas Only)

This Attachment A to Appendix A provides detail on Major Event and localized emergency event days (Affected local areas only).

PUGET SOUND ENERGY

SQI #11 Supplemental Reporting Major Event And Localized Emergency Event Days Affected Local Areas Only

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected? (Yes/No)	Comments[32]
1/18/2015	Wind	North	4	3,320	197,023	1.7%	48	14 (of 14)	Yes	14 EFRs Event Duty
1/18/2015	Wind	Central North	4	37,922	304,575	12.5%	121	18 (of 18)	Yes	18 EFRs Event Duty
1/18/2015	Wind	Central South	4	3,213	237,364	1.4%	29	11 (of 11)	Yes	11 EFRs Event Duty
1/18/2015	Wind	South	4	2,543	243,216	1.0%	37	15 (of 15)	Yes	15 EFRs Event Duty
1/18/2015	Wind	West	4	60,849	125,839	48.4%	190	13 (of 13)	Yes	13 EFRs Event Duty
3/15/2015	Wind	Central South	1	17,558	237,494	7.4%	25	10 (of 10)	No	10 EFRs Event Duty
3/15/2015	Wind	South	1	7,712	243,600	3.2%	37	11 (of 15)	No	11 EFRs Event Duty +3 EFRs Regular Day Off +1 EFR PTO
8/14/2015	Wind	Central South	2	1,531	238,151	0.6%	29	9 (of 11)	No	9 EFRs Event Duty + 2 EFR PTO
8/14/2015	Wind	South	2	6,277	244,647	2.6%	28	10 (of 15)	No	10 EFRs Event Duty + 4 EFRs Regular Day Off + 1 EFR PTO
8/14/2015	Wind	West	2	16,057	126,226	12.7%	32	9 (of 12)	No	9 EFRs Event Duty + 2 EFRs Regular Day Off + 1 EFR PTO
8/29/2015	Wind	North	7	139,938	197,852	70.7%	801	14 (of 14)	Yes	14 EFRs Event Duty
8/29/2015	Wind	Central North	7	78,763	306,883	25.7%	332	18 (of 18)	Yes	18 EFRs Event Duty

[32] **EFR**—Electric First Responder, **PTO**—Paid Time Off, **STD**—Short-Term Disability, **SP**—Service Provider

Table A3: Attachment A to Appendix A—Major Event and Localized Emergency Event Days (Affected Local Areas Only)

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected? (Yes/No)	Comments[33]
8/29/2015	Wind	Central South	7	49,896	238,151	21.0%	177	11 (of 11)	Yes	11 EFRs Event Duty
8/29/2015	Wind	South	7	98,606	244,809	40.3%	302	15 (of 15)	Yes	15 EFRs Event Duty
8/29/2015	Wind	West	7	51,559	126,226	40.8%	336	12 (of 12)	Yes	12 EFRs Event Duty
9/20/2015	Wind	West	1	18,407	126,254	14.6%	26	8 (of 12)	No	8 EFRs Event Duty + 4 EFRs Regular Day Off
10/10/2015	Wind	Central North	2	10,831	307,410	3.5%	47	11 (of 18)	No	11 EFRs Event Duty + 7 EFRs Regular Day Off
10/10/2015	Wind	Central South	2	13,146	238,551	5.5%	52	8 (of 10)	No	8 EFRs Event Duty + 3 EFRs Regular Day Off
10/10/2015	Wind	South	2	13,073	245,024	5.3%	41	9 (of 15)	No	9 EFRs Event Duty + 3 EFRs Regular Day Off + 3 EFRs PTO
10/10/2015	Wind	West	2	17,666	126,352	14.0%	59	9 (of 12)	No	9 EFRs Event Duty + 3 EFRs PTO
10/30/2015	Wind	North	1	2,772	198,484	1.4%	26	9 (of 13)	No	9 EFRs Event Duty + 1 EFR Regular Day Off + 3 EFR PTO
10/30/2015	Wind	Central North	1	7,919	307,410	2.6%	31	17 (of 18)	No	17 EFRs Event Duty + 1 EFR PTO
10/31/2015	Wind	Central North	2	22,562	307,410	7.3%	55	13 (of 17)	No	13 EFRs Event Duty + 3 EFRs Regular Day Off + 1 EFR PTO
11/17/2015	Wind	North	5	37,137	198,484	18.7%	313	14 (of 14)	Yes	14 EFRs Event Duty
11/17/2015	Wind	Central North	5	143,537	308,038	46.6%	297	18 (of 18)	Yes	18 EFRs Event Duty
11/17/2015	Wind	Central South	5	67,799	238,835	28.4%	160	11 (of 11)	Yes	11 EFRs Event Duty
11/17/2015	Wind	South	5	62,362	245,282	25.4%	239	15 (of 15)	Yes	15 EFRs Event Duty

Table continues on next page.

[33] **EFR**—Electric First Responder, **PTO**—Paid Time Off, **STD**—Short-Term Disability, **SP**—Service Provider

Table A3: Attachment A to Appendix A—Major Event and Localized Emergency Event Days (Affected Local Areas Only)

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected? (Yes/No)	Comments[34]
11/17/2015	Wind	West	5	76,223	126,511	60.3%	269	12 (of 12)	Yes	12 EFRs Event Duty
11/24/2015	Wind	North	3	13,945	198,484	7.0%	70	14 (of 14)	Yes	14 EFRs Event Duty
11/24/2015	Wind	Central North	3	906	308,038	0.3%	21	18 (of 18)	Yes	18 EFRs Event Duty
11/24/2015	Wind	Central South	3	2,505	238,835	1.0%	27	11 (of 11)	Yes	11 EFRs Event Duty
11/24/2015	Wind	South	3	339	245,282	0.1%	26	15 (of 15)	Yes	15 EFRs Event Duty
11/24/2015	Wind	West	3	95,333	126,511	75.4%	323	12 (of 12)	Yes	12 EFRs Event Duty
12/6/2015	Wind	North	3	16,879	198,911	8.5%	125	8 (of 12)	No	8 EFRs Event Duty + 4 EFRs Regular Day Off
12/6/2015	Wind	South	3	15,218	245,729	6.2%	127	8 (of 12)	No	8 EFRs Event Duty + 4 EFRs Regular Day Off
12/9/2015	Wind	North	4	9,557	198,911	4.8%	72	14 (of 14)	Yes	14 EFRs Event Duty
12/9/2015	Wind	Central North	4	77,906	308,746	25.2%	225	18 (of 18)	Yes	18 EFRs Event Duty
12/9/2015	Wind	Central South	4	49,570	239,134	20.7%	204	11 (of 11)	Yes	11 EFRs Event Duty
12/9/2015	Wind	South	4	36,812	245,729	15.0%	171	15 (of 15)	Yes	15 EFRs Event Duty
12/9/2015	Wind	West	4	30,947	126,685	24.4%	91	12 (of 12)	Yes	12 EFRs Event Duty

[34] **EFR**—Electric First Responder, **PTO**—Paid Time Off, **STD**—Short-Term Disability, **SP**—Service Provider

Table A4: Attachment B to Appendix A—Major Event and Localized Emergency Event Days (Non-Affected Local Areas Only)

This Attachment B to Appendix A provides detail on Major Event and localized emergency event days (Non-affected local areas only).

PUGET SOUND ENERGY

SQI #11 Supplemental Reporting Major Event And Localized Emergency Event Days
Non-Affected Local Areas Only

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected? (Yes/No)	Comments
3/15/2015	Wind	North	1	6	197,202	0.0%	3	14	No	
3/15/2015	Wind	Central North	1	1,982	304,959	0.6%	8	18	No	
3/15/2015	Wind	West	1	729	125,957	0.6%	6	13	No	
8/14/2015	Wind	North	2	266	197,852	0.1%	13	14	No	
8/14/2015	Wind	Central North	2	2,622	306,883	0.9%	48	18	No	
9/20/2015	Wind	North	1	1,408	198,009	0.7%	11	14	No	
9/20/2015	Wind	Central North	1	1,415	307,101	0.5%	9	18	No	
9/20/2015	Wind	Central South	1	196	238,271	0.1%	10	11	No	
9/20/2015	Wind	South	1	491	126,254	0.4%	8	15	No	
10/10/2015	Wind	North	2	4,086	198,117	2.1%	27	14	No	
10/30/2015	Wind	Central South	1	3,204	238,551	1.3%	11	11	No	
10/30/2015	Wind	South	1	6,374	245,024	2.6%	24	15	No	

Table continues on next page.

Table A4: Attachment B to Appendix A—Major Event and Localized Emergency Event Days

(Non-Affected Local Areas Only)

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected? (Yes/No)	Comments
10/31/2015	Wind	North	2	791	198,117	0.4%	27	14	No	
10/31/2015	Wind	Central South	2	8,663	238,551	3.6%	36	11	No	
10/31/2015	Wind	South	2	2,392	245,121	1.0%	30	15	No	
10/31/2015	Wind	West	2	9,110	126,352	7.2%	32	12	No	
12/6/2015	Wind	Central North	3	6,810	308,746	2.2%	39	18	No	
12/6/2015	Wind	Central South	3	3,805	239,134	1.6%	23	11	No	
12/6/2015	Wind	West	3	9,500	126,685	7.5%	47	12	No	

Table A5: Attachment C to Appendix A—Natural Gas Reportable Incidents and Control Time

This Attachment C to Appendix A provides detail on each natural gas reportable incident and response times.[35]

Natural Gas Reportable Incidents and Control Time						
Date	City	Address	1st Notice to PSE	First PSE Arrival	Emergency Controlled	Emergency Control Time
1/3/2015	Shoreline	17071 12th Ave NW	3:13	3:43	9:38	5:55
1/26/2015	Renton	2316 S 21st St	13:24	13:43	14:24	0:41
1/29/2015	Kirkland	11829 NE 131st Pl	13:12	13:36	13:42	0:06
2/16/2015	Renton	2009 Dayton Dr SE	13:58	14:26	16:11	1:45
2/17/2015	Tacoma	2515 1/2 S Tacoma Way	13:03	13:42	14:55	1:13
2/27/2015	Snohomish	13021 182nd Ave SE	13:50	14:36	14:45	0:09
3/6/2015	Seattle	9715 Palatine Ave N	13:49	13:58	14:10	0:12
3/18/2015	Everett	3512 Everett Ave	7:30	7:39	10:33	2:54
3/19/2015	Federal Way	1706 S 320th St	10:54	11:04	11:24	0:20
4/1/2015	Federal Way	31451 40th Ave SW	16:26	16:41	20:00	3:19
4/25/2015	Kent	24421 147th Ave SE	15:04	15:39	15:49	0:10
5/10/2015	Bellevue	13641 NE 42nd St	9:27	9:58	12:38	2:40
5/11/2015	Orting	128 Washington Ave S	7:41	8:27	8:43	0:16

Table continues on next page

[35] Report of the time duration from first arrival to control of gas emergencies, for incidents subject to reporting under the 2003 edition of WAC 480-93-200 and WAC 480-93-210, Order R-374, Docket Number UG-911261.

Natural Gas Reportable Incidents and Control Time						
Date	City	Address	1st Notice to PSE	First PSE Arrival	Emergency Controlled	Emergency Control Time
5/22/2015	Everett	2729 Harrison Ave	12:26	12:48	15:31	2:43
5/27/2015	Mercer Island	6059 78th Ave SE	15:07	15:25	18:52	3:27
6/7/2015	Renton	19312 140th Pl SE	19:29	19:30	19:30	0:00
6/9/2015	Seattle	505 3rd Ave	2:14	3:02	4:22	1:20
6/13/2015	Seattle	3201 E Republican St	11:48	12:35	13:17	0:42
6/18/2015	Bellevue	14360 SE Eastgate Way	9:26	9:33	10:09	0:36
7/6/2015	Bothell	2005 Palomino Dr	19:42	20:11	21:45	1:34
7/16/2015	Mercer Island	2926 72nd Ave SE	11:12	11:28	11:38	0:10
8/12/2015	Bellevue	550 106th Ave NE	12:02	12:18	12:41	0:23
8/17/2015	Everett	1605 SE Everett Mall Way	13:39	13:53	15:25	1:32
9/1/2015	Renton	16627 113th Ave SE	13:58	14:35	14:42	0:07
9/17/2015	Redmond	7704 151st Ave NE	14:32	14:53	15:05	0:12
9/19/2015	Everett	15314 Silver Firs Dr	10:46	11:11	11:28	0:17
9/23/2015	Seattle	2559 26th Ave W	11:46	12:23	12:31	0:08

Table continues on next page.

Natural Gas Reportable Incidents and Control Time						
Date	City	Address	1st Notice to PSE	First PSE Arrival	Emergency Controlled	Emergency Control Time
10/5/2015	Lacey	3524 College St SE	15:29	15:48	19:00	3:12
10/13/2015	Federal Way	32237 7th Ave SW	12:24	12:42	14:59	2:17
11/17/2015	Issaquah	14614 262nd Ave SE	14:20	14:50	16:42	1:52
12/6/2015	Lake Stevens	1931 Vernon Rd	18:45	19:10	23:39	4:29
					Average Control Time for 2015	**1:26**

B

Certification of Survey Results

EMC RESEARCH MARKET & OPINION RESEARCH SERVICES

720 Third Avenue
Suite 1110
Seattle, WA 98104
206.652.2454

436 14th Street
Suite 820
Oakland, CA 94612
510.844.0680

88 E Broad Street
Suite 1270
Columbus, OH 43215
614.268.1660

610 SW Alder Street
Suite 521
Portland, OR 97205
503.444.6000

EMCresearch.com

TO: Eric Haechrel, Puget Sound Energy
FR: Andrew Thibault, EMC Research, Inc.
DT: January 12, 2016
RE: PSE Service Quality Index Research

This memo constitutes certification by EMC Research, Inc. that the attached report and underlying surveys were conducted and prepared in accordance with the procedures established in Docket Nos. UE-011570 and UG-011571.

These procedures, data collection methods, and quality controls are consistent with industry practices and, we believe, ensure that the data collected and information produced in the surveys is unbiased and valid.

We are glad to answer any questions about the research methodology and provide any additional information you may need.

Sincerely,

Andrew Thibault, Principal
EMC Research Inc.

C
Penalty Calculation and Penalty Waiver Petition

Appendix C consists of the following:

Table C1 shows the penalty calculation and allocation associated with PSE's 2015 SQI #5-Customer Access Center Answering Performance of 70%, which did not meet the SQI #5 benchmark of 75%.

Table C2 shows the potential penalty calculation and allocation of SQI #3-SAIDI if the UTC does not waive any of the SQI SAIDI penalties or approve any exclusion of the two extraordinary outage events that occurred in August and November 2015 from the SQI SAIDI performance calculation as in PSE's petition with the UTC. (The petition is filing concurrently with this 2015 SQI and Electric Service Reliability Report as Attachment D to the annual filling on March 31, 2016.)

Table C1: Penalty calculation and allocation associated with PSE's 2015 SQI #5-Customer Access Center Answering Performance of 70%, which did not meet the SQI #5 benchmark of 75%.

Table C1--Calculated SQI #5 Penalty

SQI #		Benchmark		Overall Performance	Difference from Benchmark	Penalty	Calculation
5	Customer Access Center Answering Performance	75%	of calls answered live by company rep within 30 seconds of request to speak to live operator	70%	-5%	$360,000	$360,000 = ((75-70) /75) * 100 * $54,000

Average Annual Customer

Natural Gas	794,808
Electric	1,103,403
Total	1,898,211

Refund Calculation

SQI #		Total	Natural Gas		Electric	
5	Customer Access Center Answering Performance	$360,000	$150,737	= 360,000* (794,808 / 1,898,211)	$209,263	= 360,000* (1,103,403 / 1,898,211)
	Total	**$360,000**	**$150,737**		**$209,263**	

Table C2 shows the potential penalty calculation and allocation of SQI #3-SAIDI if the UTC does not approve any exclusion of the two extraordinary outage events that occurred in August and November 2015 from the SQI SAIDI performance calculation as in PSE's petition with the UTC. (The petition is filing concurrently with this 2015 SQI and Electric Service Reliability Report as Attachment D to the annual filling on March 31, 2016.)

Table C2--Calculated SQI #3 Potential Penalty

SQI #		Benchmark		Overall Performance	Difference from Benchmark	Penalty	Calculation	
3	SAIDI (System Average Interruption Duration Index)	320	minutes per customer per year	361	41	$432,422	$432,422	= ((361-320) /320) * 10 * $337,500

Average Annual Customer

Not applicable to natural gas customers

Electric	1,103,403
Total	1,103,403

Potential Refund Calculation

SQI #		Total	Natural Gas		Electric	
3	SAIDI (System Average Interruption Duration Index)	$432,422	$0	= 432,422* (0 / 1,103,403)	$432,422	= 432,422* (1,103,403 / 1,103,403)
	Total	**$432,422**	**$0**		**$432,422**	

D
Proposed Customer Notice (Report Card)

2015 Service Quality Report Card

The Customer Service Performance Report Card is designed to inform customers of how well PSE delivers its services in key areas to its customers. The Report Card will be distributed to customers only after adequate consultation with Staff and Public Counsel, but no later than 90 days after PSE files its annual SQI and Electric Service Reliability Report.

This appendix presents two versions of the draft 2015 Customer Service Performance Report Card based upon the UTC's decision on the exclusion of the two extraordinary outage events that occurred in August and November 2015 from the SQI SAIDI performance calculation as in PSE's petition with the UTC. (The petition is filing concurrently with this 2015 SQI and Electric Service Reliability Report as Attachment D to the annual filling on March 31, 2016.)

Figure D1 shows the version that if the UTC approves the exclusion of both extraordinary outage events from the SQI SAIDI performance calculation.

Figure D2 shows the version that if the UTC disapproves PSE's petition for the penalty waiver or exclusion of both extraordinary outage events from the SQI SAIDI performance calculation.

Figure D1: Draft 2015 Service Quality Report Card if the UTC approves the exclusion of both extraordinary outage events from the SQI SAIDI performance calculation.

2015 Service Quality Report Card

KEY MEASUREMENT	BENCHMARK	2015 PERFORMANCE	ACHIEVED
CUSTOMER SATISFACTION			
Percent of customers satisfied with our Customer Care Center services, based on survey	At least 90 percent	94 percent	✓
Percent of customers satisfied with field services, based on survey	At least 90 percent	96 percent	✓
Number of complaints to the WUTC per 1,000 customers, per year	Less than 0.40	0.23	✓
CUSTOMER SERVICES			
Percent of calls answered live within 30 seconds by our Customer Care Center	At least 75 percent	70 percent	
OPERATIONS SERVICES			
Frequency of non-major-storm power outages, per year, per customer	Less than 1.30 outages	1.11 outages	✓
Length of power outages per year, per customer	Less than 5 hours, 20 minutes	4 hours, 32 minutes	✓
Time from customer call to arrival of field technicians in response to electric system emergencies	No more than 55 minutes	54 minutes	✓
Time from customer call to arrival of field technicians in response to natural gas emergencies	No more than 55 minutes	29 minutes	✓
Percent of service appointments kept	At least 92 percent	100 percent *	✓

* Percent in table rounded up from 99.6 percent result.

Each year Puget Sound Energy measures service-quality benchmarks established in cooperation with the Washington Utilities and Transportation Commission (UTC), the Public Counsel how well we deliver our services to you and all of our customers in three key areas: Customer Satisfaction, Customer Services and Operations Services.

2015 Performance Highlights

In 2015 we met eight of the nine service metrics (see chart above). We are pleased to report improvements from the prior year in three of the measurements.
They include:

- greater satisfaction when you called PSE
- shorter duration of power outages
- faster response time to natural gas emergencies

Several factors contributed to the missed live-call target, incurring a $360,000 penalty. A changed bill-collection process led to increased calls and lengthier call times, and inadvertently coincided when we were in the process of hiring and training new agents not yet ready to take calls. Also, failures on our technology systems that support our online and self-serve outage reporting and information tools during last August's widespread power outage drove customers to call us and experience longer-than-usual wait times.

Through our two Service Guarantees —keeping scheduled appointments and restoring power interruptions as soon as we can— we provide a $50 credit on your bill. In 2015, we credited customers a total of $16,250 for missing 325, or 0.4 percent, of our total 94,834 scheduled appointments.

Every day our employees continually aim to achieve new levels of providing safe, dependable and efficient service to meet your expectations of us.

Figure D2: Draft 2015 Service Quality Report Card if the UTC disapproves the exclusion of both extraordinary outage events from the SQI SAIDI performance calculation.

2015 Service Quality Report Card

KEY MEASUREMENT	BENCHMARK	2015 PERFORMANCE	ACHIEVED
CUSTOMER SATISFACTION			
Percent of customers satisfied with our Customer Care Center services, based on survey	At least 90 percent	94 percent	✓
Percent of customers satisfied with field services, based on survey	At least 90 percent	96 percent	✓
Number of complaints to the WUTC per 1,000 customers, per year	Less than 0.40	0.23	✓
CUSTOMER SERVICES			
Percent of calls answered live within 30 seconds by our Customer Care Center	At least 75 percent	70 percent	
OPERATIONS SERVICES			
Frequency of non-major-storm power outages, per year, per customer	Less than 1.30 outages	1.11 outages	✓
Length of power outages per year, per customer	Less than 5 hours, 20 minutes	6 hours, 1 minutes	
Time from customer call to arrival of field technicians in response to electric system emergencies	No more than 55 minutes	54 minutes	✓
Time from customer call to arrival of field technicians in response to natural gas emergencies	No more than 55 minutes	29minutes	✓
Percent of service appointments kept	At least 92 percent	100 percent *	✓

* Percent in table rounded up from 99.6 percent result.

Each year Puget Sound Energy measures service-quality benchmarks established in cooperation with the Washington Utilities and Transportation Commission, the Public Counsel how well we deliver our services to you and all of our customers in three key areas: Customer Satisfaction, Customer Services and Operations Services.

2015 Performance Highlights

In 2015 we met seven of the nine service metrics (see chart above). While it's the first time in seven years that we missed two benchmarks, we are pleased to report improvements from the prior year in three of the measurements. They include:

- greater satisfaction when you called PSE
- faster response time to natural gas emergencies

The areas where we fell short were in 1) the percent of calls answered live within 30 seconds and 2) the average length, or duration, of power outages per electric customer.

Several factors contributed to the missed live-call target, incurring a $360,000 penalty. A changed bill-collection process led to increased calls and lengthier call times, and inadvertently coincided when we were in the process

of hiring and training new agents not yet ready to take calls. Also, failures on our technology systems that support our online and self-serve outage reporting and information tools during last August's widespread power outage drove customers to call us and experience longer-than-usual wait times.

In 2015, it took our crews longer to restore power outages in the aftermath of two severe, damaging windstorms due to a very high number of fallen trees, which were weakened by the year's extreme drought condition and prevented our crews from immediate access to neighborhoods. As a result, we incurred a $485,156 penalty for missing the outage duration target.

Through our two Service Guarantees —keeping scheduled appointments and restoring power interruptions as soon as we can— we provide a $50 credit on your bill. In 2015, we credited customers a total of $16,250 for missing 325, or 0.4 percent, of our total 94,834 scheduled appointments.

Every day our employees continually aim to achieve new levels of providing safe, dependable and efficient service to meet your expectations of us.

E
Disconnection Results

Tables E1 and E2 provide the annual and monthly number of disconnections per 1,000 customers for non-payment of amounts due when the UTC disconnection policy would permit service curtailment.

Table E1: Annual Disconnection Results from 2011 to 2015 per 1,000 Customers

2011	2012	2013	2014	2015
37	33	13	47	50

Table E2: Monthly Disconnection Results per 1,000 Customers for 2015

Month	Disconnections per 1000 Customers
January	3
February	4
March	5
April	7
May	5
June	6
July	4
August	4
September	5
October	5
November	1
December	1

F
Customer Service Guarantee Performance Detail

This appendix provides detail on SQI #10, Appointments Kept, performance and customer service guarantee payment by service type and month.

Definition of the Categories:

Canceled—Appointments canceled by either customers or PSE

Excused—Appointments missed due to customer reasons or due to SQI Major Events

Manual Kept—Adjusted missed appointments resulting from review by the PSE personnel

Missed Approved—Appointments missed due to PSE reasons and customers are paid the $50 Customer Service Guarantee payment

Missed Open—Appointments not yet reviewed by PSE for the $50 Service Guarantee payment

Customer Service Guarantee Payment—Total for the $50 Customer Service Guarantee payments made to customers for each missed approved appointment

System Kept—Appointments in which PSE arrived at the customer site as promised

Total Appointments (Excludes Canceled and Excused)—Sum of Total Missed and Total Kept

Total Kept—Total number of Manual Kept and System Kept

Total Missed—Total number of Missed Approved, Missed Denied, and Missed Open

Table F1: SQI #10 and Customer Service Guarantee Payment Annual Summary for 2015

2015 SQI #10 and Customer Service Guarantee Payment Annual Summary											
	Total Appts (Exclude Canceled)	Missed Approved	Missed Open	Total Missed	Manual Kept	System Kept	Total Kept	Canceled	Excused	Customer Service Guarantee Payment	Percent Kept (Exclude Canceled and Excused) [36]
Electric											
Permanent Service	7,704	97	-	97	259	7,348	7,607	-	-	$4,850	99%
Reconnection	42,887	34	9	43	135	42,709	42,844	-	23	$1,700	100%
Sub-total	50,591	131	9	140	394	50,057	50,451	-	23	$6,550	100%
Gas											
Diagnostic	20,892	8	-	8	687	20,197	20,884	-	-	$400	100%
Permanent Service	9,484	174	11	185	490	8,809	9,299	-	-	$8,700	98%
Reconnection	13,867	12	-	12	190	13,665	13,855	-	-	$600	100%
Sub-total	44,243	194	11	205	1,367	42,671	44,038	-	-	$9,700	100%
Grand	94,834	325	20	345	1,761	92,728	94,489	-	23	$16,250	100%

[36] Results shown are rounded to the nearest whole percentage per UTC order for performance calculation and comparison to the benchmark. However, these 100% monthly performance results do not reflect that PSE met all its appointments during the reporting period.

Table F2: SQI #10 and Customer Service Guarantee Payment Annual Details for 2015

2015 SQI #10 and Customer Service Guarantee Payment Monthly Details												
Month	Fuel	Type	Total Appts (Exclude Canceled and Excused)	Missed Approved	Missed Open	Total Missed	Manual Kept	System Kept	Total Kept	Canceled	Excused	Customer Service Guarantee Payment
Jan-15	Electric	Permanent Service	614	1	-	1	45	568	613	-	-	$50
Jan-15	Electric	Reconnection	2,560	9	-	9	9	2,542	2,551	-	-	$450
Jan-15	Gas	Diagnostic	1,913	1	-	1	47	1,865	1,912	-	-	$50
Jan-15	Gas	Permanent Service	753	4	-	4	31	718	749	-	-	$200
Jan-15	Gas	Reconnection	928	-	-	-	11	917	928	-	-	$0
Jan-15 Total			**6,768**	**15**	**-**	**15**	**143**	**6,610**	**6,753**		**-**	**$750**
Feb-15	Electric	Permanent Service	584	7	-	7	23	554	577	-	-	$350
Feb-15	Electric	Reconnection	2,698	1	-	1	4	2,693	2,697	-	-	$50
Feb-15	Gas	Diagnostic	1,509	-	-	-	48	1,461	1,509	-	-	$0
Feb-15	Gas	Permanent Service	751	10	-	10	26	715	741	-	-	$500
Feb-15	Gas	Reconnection	1,118	1	-	1	15	1,102	1,117	-	-	$50
Feb-15 Total			**6,660**	**19**	**-**	**19**	**116**	**6,525**	**6,641**		**-**	**$950**
Mar-15	Electric	Permanent Service	655	1	-	1	22	632	654	-	-	$50
Mar-15	Electric	Reconnection	3,217	3	-	3	10	3,204	3,214	-	-	$150
Mar-15	Gas	Diagnostic	1,434	1	-	1	43	1,390	1,433	-	-	$50
Mar-15	Gas	Permanent Service	807	9	-	9	36	762	798	-	-	$450
Mar-15	Gas	Reconnection	1,214	1	-	1	13	1,200	1,213	-	-	$50
Mar-15 Total			**7,327**	**15**	**-**	**15**	**124**	**7,188**	**7,312**		**-**	**$750**

Table continues on next page.

2015 SQI #10 and Customer Service Guarantee Payment Monthly Details												
Month	Fuel	Type	Total Appts (Exclude Canceled and Excused)	Missed Approved	Missed Open	Total Missed	Manual Kept	System Kept	Total Kept	Canceled	Excused	Customer Service Guarantee Payment
Apr-15	Electric	Permanent	744	6	-	6	18	720	738	-	-	$300
Apr-15	Electric	Reconnection	4,292	1	-	1	12	4,279	4,291	-	-	$50
Apr-15	Gas	Diagnostic	1,249	-	-	-	37	1,212	1,249	-	-	$0
Apr-15	Gas	Permanent	852	71	-	71	42	739	781	-	-	$3,550
Apr-15	Gas	Reconnection	1,270	4	-	4	16	1,250	1,266	-	-	$200
Apr-15 Total			**8,407**	**82**	**-**	**82**	**125**	**8,200**	**8,325**		**-**	**$4,100**
May-15	Electric	Permanent	581	4	-	4	20	557	577	-	-	$200
May-15	Electric	Reconnection	4,421	1	-	1	15	4,405	4,420	-	-	$50
May-15	Gas	Diagnostic	932	1	-	1	39	892	931	-	-	$50
May-15	Gas	Permanent	760	10	-	10	30	720	750	-	-	$500
May-15	Gas	Reconnection	1,217	2	-	2	10	1,205	1,215	-	-	$100
May-15 Total			**7,911**	**18**	**-**	**18**	**114**	**7,779**	**7,893**		**-**	**$900**
Jun-15	Electric	Permanent	647	7	-	7	8	632	640	-	-	$350
Jun-15	Electric	Reconnection	5,068	8	-	8	16	5,044	5,060	-	-	$400
Jun-15	Gas	Diagnostic	911	-	-	-	31	880	911	-	-	$0
Jun-15	Gas	Permanent	785	10	-	10	31	744	775	-	-	$500
Jun-15	Gas	Reconnection	1,326	-	-	-	14	1,312	1,326	-	-	$0
Jun-15 Total			**8,737**	**25**	**-**	**25**	**100**	**8,612**	**8,712**		**-**	**$1,250**

Table continues on next page.

2015 SQI #10 and Customer Service Guarantee Payment Monthly Details												
Month	Fuel	Type	Total Appts (Exclude Canceled and Excused)	Missed Approved	Missed Open	Total Missed	Manual Kept	System Kept	Total Kept	Canceled	Excused	Customer Service Guarantee Payment
Jul-15	Electric	Permanent	594	5	-	5	11	578	589	-	-	$250
Jul-15	Electric	Reconnection	3,745	-	-	-	10	3,735	3,745	-	-	$0
Jul-15	Gas	Diagnostic	936	-	-	-	32	904	936	-	-	$0
Jul-15	Gas	Permanent	744	8	-	8	55	681	736	-	-	$400
Jul-15	Gas	Reconnection	1,040	-	-	-	20	1,020	1,040	-	-	$0
Jul-15 Total			**7,059**	**13**	**-**	**13**	**128**	**6,918**	**7,046**		**-**	**$650**
Aug-15	Electric	Permanent	613	1	-	1	8	604	612	-	-	$50
Aug-15	Electric	Reconnection	3,579	-	5	5	8	3,566	3,574	-	-	$0
Aug-15	Gas	Diagnostic	871	-	-	-	32	839	871	-	-	$0
Aug-15	Gas	Permanent	772	10	-	10	42	720	762	-	-	$500
Aug-15	Gas	Reconnection	828	-	-	-	17	811	828	-	-	$0
Aug-15 Total			**6,663**	**11**	**5**	**16**	**107**	**6,540**	**6,647**		**-**	**$550**
Sep-15	Electric	Permanent	750	19	-	19	10	721	731	-	-	$950
Sep-15	Electric	Reconnection	4,678	3	2	5	14	4,659	4,673	-	13	$150
Sep-15	Gas	Diagnostic	1,812	-	-	-	57	1,755	1,812	-	-	$0
Sep-15	Gas	Permanent	831	4	-	4	52	775	827	-	-	$200
Sep-15	Gas	Reconnection	1,268	1	-	1	17	1,250	1,267	-	-	$50
Sep-15 Total			**9,339**	**27**	**2**	**29**	**150**	**9,160**	**9,310**		**13**	**$1,350**

Table continues on next page.

2015 SQI #10 and Customer Service Guarantee Payment Monthly Details												
Month	Fuel	Type	Total Appts (Exclude Canceled and Excused)	Missed Approved	Missed open	Total Missed	Manual Kept	System Kept	Total Kept	Canceled	Excused	Customer Service Guarantee Payment
Oct-15	Electric	Permanent	727	6	-	6	14	707	721	-	-	$300
Oct-15	Electric	Reconnection	5,040	2	-	2	17	5,021	5,038	-	-	$100
Oct-15	Gas	Diagnostic	2,461	-	-	-	80	2,381	2,461	-	-	$0
Oct-15	Gas	Permanent	828	15	-	15	66	747	813	-	-	$750
Oct-15	Gas	Reconnection	1,550	1	-	1	18	1,531	1,549	-	-	$50
Oct-13 Total			10,606	24	-	24	195	10,387			-	$1,200
Nov-15	Electric	Permanent	507	17	-	17	29	461	490	-	-	$850
Nov-15	Electric	Reconnection	1,904	4	2	6	9	1,889	1,898	-	4	$200
Nov-15	Gas	Diagnostic	3,455	2	-	2	131	3,322	3,453	-	-	$100
Nov-15	Gas	Permanent	838	9	1	10	62	766	828	-	-	$450
Nov-15	Gas	Reconnection	1,204	2	-	2	26	1,176	1,202	-	-	$100
Nov-15 Total			7,908	34	3	37	257	7,614	7,871		4	$1,700
Dec-15	Electric	Permanent	688	23	-	23	51	614	665	-	-	$1,150
Dec-15	Electric	Reconnection	1,685	2	-	2	11	1,672	1,683	-	6	$100
Dec-15	Gas	Diagnostic	3,409	3	-	3	110	3,296	3,406	-	-	$150
Dec-15	Gas	Permanent	763	14	10	24	17	722	739	-	-	$700
Dec-15	Gas	Reconnection	904	-	-	-	13	891	904	-	-	$0
Dec-15 Total			**7,449**	**42**	**10**	**52**	**202**	**7,195**	**7,397**		**6**	**$2,100**
Grand Total			**94,834**	**325**	**20**	**345**	**1,761**	**92,728**	**94,489**	**-**	**23**	**$16,250**

G
Customer Awareness of Customer Service Guarantee

In 2015, PSE used a variety of communication channels to broaden the reach in making customers aware of the availability of the Customer Service Guarantee. The channels included:

Customer newsletter promotion
(*Included and linked to monthly paper and electronic bills; posted year-round on pse.com)*
Published articles in February 2015[37] "The Voice of my PSE" (EnergyWise); August 2015[38]; and October 2015[39].

Monthly billing statement
Viewed on every monthly bill

Billing statement envelope
Appeared September 2015 on the outer mailing envelope

Informed every new customer
Included in the Your customer rights and responsibilities[40] brochure, delivered to every customer new to PSE service. Brochure is posted year-round on pse.com.

Dedicated presence on pse.com year-round
Provided customers with links to dedicated website landing page[41].

Contacts by phone or in person with Customer Care Center representatives and field employees
In 2015, every newly-hired PSE Customer Care Center and Customer Service Office representatives received training about the Service Guarantee. An online job aid that explains the circumstances for notifying customers about the Service Guarantee is available to all representatives and field employees.

In their conversations with customers, representatives as well as field employees who meet with customers for scheduled appointments, follow this script:

> *If we miss your customer service guarantee appointment under normal operating conditions, we will automatically credit your energy account with $50—guaranteed.*

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[37] http://pse.com/accountsandservices/YourAccount/monthlyPromotions/Documents/3671_voice_2015-02.pdf
[38] http://pse.com/accountsandservices/YourAccount/monthlyPromotions/Documents/3671_voice_2015-08.pdf
[39] http://pse.com/accountsandservices/YourAccount/monthlyPromotions/Documents/3671_voice_2015-10.pdf
[40] http://pse.com/accountsandservices/Documents/6275_wb.pdf
[41] http://pse.com/accountsandservices/NewToPSE/Pages/Customer-Commitment.aspx?utm_source=YourAccount&utm_medium=FeaturedContent&utm_campaign=redesign&utm_content=3

In addition, builders and anyone with a construction project that requires the scheduling of a site visit by PSE, are made aware of the Service Guarantee at the time of the appointment as well as in handbook[42] materials. Other approaches used to inform customers of the Customer Service Guarantee include the natural gas and electric new service handbooks and brochures and PSE's website, PSE.com.

The results of customer awareness surveys are presented in Table G1.

[42] http://pse.com/accountsandservices/Construction/Documents/2772.pdf

Table G1: Customer Awareness of Customer Service Guarantee

		Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15
Field Service Operations Transactions Customer Satisfaction Survey													
Q26A. When you called to make the appointment for a service technician to come out, did the customer service representative tell you about PSE $50 Service Guarantee?	Yes	75	48	52	54	57	67	63	42	55	78	61	68
	No	121	94	112	112	112	93	137	117	100	119	87	103
	Don't Know	52	44	50	51	54	44	50	41	45	49	31	49
	Refused Response	2	-	-	3	1	2	-	-	-	4	1	-
	Total Customers Surveyed	**250**	**186**	**214**	**220**	**224**	**206**	**250**	**200**	**200**	**250**	**180**	**220**
Q26C. Which of the following best fits your understanding of how the service guarantee works if a scheduled appointment has to be changed by PSE.	You are given the $50 service guarantee if the rescheduled time causes you inconvenience.	33	13	16	24	12	12	29	22	27	28	25	22
	Whenever PSE changes an appointment, you are given the $50.	29	25	25	27	27	43	32	25	24	43	24	25
	You have no understanding or expectations about this part of the service guarantee plan.	150	114	134	144	149	128	156	124	106	144	112	134
	Don't Know	28	28	34	21	29	20	28	27	41	30	16	33
	Refused Response	10	6	5	4	7	3	5	2	2	5	3	6
	Total Customers Surveyed	**250**	**186**	**214**	**220**	**224**	**206**	**250**	**200**	**200**	**250**	**180**	**220**

Table continues on next page.

Field Service Operations Transactions Customer Satisfaction Survey		Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15
Q26D. Did your appointment have to be rescheduled or did it occur as planned?	It occurred as planned.	237	179	203	207	211	190	235	184	185	237	172	205
	It was rescheduled.	6	4	7	7	5	8	8	8	10	8	4	7
	Technician arrived but was late.	1	1	-	1	1	1	1	3	2	1	1	2
	Don't Know	4	2	3	2	6	6	4	4	3	3	2	4
	Refused Response	2	-	1	3	1	1	2	1	-	1	1	2
	Total Customers Surveyed	**250**	**186**	**214**	**220**	**224**	**206**	**250**	**200**	**200**	**250**	**180**	**220**
Q26E. Who initiated rescheduling your appointment?	Myself (Customer Initiated)	5	3	5	4	3	5	3	8	7	6	2	5
	Puget Sound Energy (PSE) Initiated	1	1	1	3	1	3	4	-	3	2	2	2
	Don't Know	-	-	1	-	1	-	1	-	-	-	-	-
	Refused Response	-	-	-	-	-	-						
	Total Customers Surveyed	**6**	**4**	**7**	**7**	**5**	**8**	**8**	**8**	**10**	**8**	**4**	**7**

H
Electric Reliability Terms and Definitions

Terms and Definitions

Area of Greatest Concern—An area targeted for specific actions to improve the level of service reliability or quality.

Cause Codes—Codes used to identify PSE's best estimation of what caused a Sustained Interruption to occur. The codes are listed below:

Code	Description	Code	Description
AO	Accident Other, with Fires	**FI**	Faulty Installation
BA	Bird or Animal	**LI**	Lightning
CP	Car Pole Accident	**SO**	Scheduled Outage (was WR − Work Required)
CR	Customer Request	**TF**	Tree − Off Right-of-Way
DU	Dig Up Underground	**TO**	Tree − On Right-of-Way
EF	Equipment Failure	**TV**	Trees/Vegetation
EO	Electrical Overload	**UN**	Unknown Cause (unknown equipment involved only)
EQ	Earthquake	**VA**	Vandalism

Commission Complaint—Any single-customer electric-service reliability complaint filed by a customer with the Washington Utilities and Transportation Commission (UTC).

Customer Complaint—Repeated Customer Inquiries relating to dissatisfaction with the resolution or explanation of a concern related to a Sustained Interruption or Power Quality. This is indicated by two or more recorded contacts in PSE's customer information system during current and prior year.

Customer Count—The number of electric customers per the outage reporting system that is a part of SAP, PSE's work management, customer information and financial information system.

Customer Inquiry—An event whereby a customer contacts the Customer Care Center to report a Sustained Interruption or Power Quality concern.

Duration of Sustained Interruption—The period beginning when PSE is first informed that service to a customer has been interrupted, and ending when the problem which caused the interruption has been resolved and the line has been re-energized (measured in minutes, hours or days).

Equipment Codes

Code	Description	Code	Description
OCN	Overhead Secondary Connector	**OTF**	Overhead Transformer Fuse
OCO	Overhead Conductor	**OTR**	Overhead Transformer
OFC	Overhead Cut − Out	**UEL**	Underground Elbow
OFU	Overhead Line Fuse / Fuse Link	**UFJ**	Underground J – Box
OJU	Overhead Jumper Wire	**UPC**	Underground Primary Cable
OPO	Distribution Pole	**UPT**	Padmount Transformer
OSV	Overhead Service	**USV**	Underground Service

IEEE 1366—IEEE Standard 1366-2003, a guide approved and published by the Institute of Electrical and Electronics Engineers that defines electric power reliability indices and factors that affect their calculations.

Major Event—An event, such as a storm, that causes serious reliability problems. PSE utilizes two Major Event criteria to evaluate its reliability performance: 5% Exclusion Major Event Days and IEEE 1366 T_{MED} Exclusion Major Event Days.

Major Event Days—Days when outage events can be excluded from the reliability performance calculation. The two types of Major Event Days are:

5% Exclusion Major Event Days—Days that five percent or more of electric customers are experiencing an electric outage during a 24-hour period and subsequent days when the service to those customers is being restored

IEEE 1366 T_{MED} Exclusion Major Event Days—Any days in which the daily system SAIDI exceeds the threshold value, T_{MED}.

Outage—The state of a system component when it is not available to perform its intended function, due to some event directly associated with that component. For the most part, a component's unavailability is considered an outage when it causes a sustained interruption of service to customers. The system component can be transmission, distribution or customer owned if it causes a sustained interruption to other customers.

Power Quality—Industry standards are not broad enough to define power quality or how and when to measure it. For purposes of this plan, power quality includes all other physical characteristics of electrical service except for Sustained Interruptions, including momentary outages, voltage sags, voltage flicker, harmonics and voltage spikes.

SAIDI—System Average Interruption Duration Index—This index is commonly referred to as customer-minutes of interruption (CMI) or customer hours, and is designed to provide information about the average time the customers are interrupted. The measurements used in PSE's Plan and reporting include Total methodology ($SAIDI_{Total}$), Total with five-year-rolling average methodology ($SAIDI_{Total\ 5\text{-}year\ Average}$), 5% exclusion methodology ($SAIDI_{5\%}$), and IEEE methodology ($SAIDI_{IEEE}$). The performance results for each of the measurement will be calculated according to the following:

$$\mathbf{SAIDI_{Total}} = \frac{\sum \textit{All customer interruption minutes}}{\textit{Average annual electric customer count}}$$

$\mathbf{SAIDI_{Total\ 5\text{-}year\ Average}}$ = Rolling five-year average of current year Annual $SAIDI_{Total}$ and prior four years Annual $SAIDI_{Total}$ results, excluding any exclusion that has been approved by the UTC. Exclusions for an entire year will be replaced by the preceding Annual $SAIDI_{Total}$ performance results until there are five years included in the calculation of current year $SAIDI_{Total\ 5\text{-}year\ Average.}$ Exclusions for an event will not be included in the Annual $SAIDI_{Total}$ performance results.

$$\mathbf{SAIDI_{5\%}} = \frac{\sum \textit{Customer interruption minutes during non-5\%-Exclusion-Major-Event-Days}}{\textit{Average annual electric customer count}}$$

$$\mathbf{SAIDI_{IEEE}} = \frac{\sum \textit{Customer interruption minutes during non-IEEE-1366-}T_{MED}\textit{-Exclusion-Major-Event Days}}{\textit{Average annual electric customer count}}$$

SAIFI—System Average Interruption Frequency Index—This index is designed to give information about the average frequency of sustained interruptions per customers. The measurements used in PSE's Plan and reporting include Total methodology ($SAIFI_{Total}$), Total with five-year-rolling average methodology ($SAIFI_{Total\ 5\text{-}year\ Average}$), 5% exclusion methodology ($SAIFI_{5\%}$) and IEEE methodology ($SAIFI_{IEEE}$). The performance results for each of the measurement will be calculated according to the following:

$$\mathbf{SAIFI_{Total}} = \frac{\textit{Total number of customers that experienced Sustained Interruptions}}{\textit{Average annual electric customer count}}$$

$SAIFI_{Total\ 5\text{-}year\ Average}$= Rolling five-year average of current year Annual Total SAIFI and prior four years Annual Total SAIFI results, excluding any exclusion that has been approved by the UTC. Exclusions for an entire year will be replaced by the preceding Annual $SAIFI_{Total}$ performance results until there are five years included in the calculation of current year $SAIFI_{Total\ 5\text{-}year\ Average.}$ Exclusions for an event will not be included in the Annual $SAIFI_{Total}$ performance results.

$$SAIFI_{5\%} = \frac{\textit{No. of customers that experienced Sustained Interruptions during non-5\%-Exclusion-Major-Event-Days}}{\textit{Average annual electric customer count}}$$

$$SAIFI_{IEEE} = \frac{\textit{No. of customers that experienced Sustained Interruptions during non-IEEE-1366-}T_{MED}\textit{-Exclusion-Major-Event-Days}}{\textit{Average annual electric customer count}}$$

SQ—PSE's Service Quality Program was first established per conditions of the Puget Power and Washington Natural Gas merger in 1997 under Docket Number UE-960195. The SQ Program has been since extended and modified in Docket Numbers UE-011570 and UG-011571 (consolidated), Docket Number UE-031946, and Docket Numbers UE-072300 and UG-072301 (consolidated).

Step Restoration—The restoration of service to blocks of customers in an area until the entire area or feeder is restored.

Sustained Interruption—Any interruption not classified as a momentary event. PSE records any interruption longer than one minute as a Sustained Interruption.

T_{MED}—The Major Event Day identification threshold value that is calculated at the end of each reporting year for use during the next reporting year. It is determined by reviewing the past five years of daily system SAIDI, and using the IEEE 1366 2.5 beta methodology in calculating the threshold value. Any days having a daily system SAIDI greater than T_{MED} are days on which the energy-delivery system experienced stresses beyond those normally expected, which are classified as Major Event Days.

$T_{MED} = e^{(\alpha + 2.5\beta)}$ where α is the log-average of the data set and β is the log-standard deviation of the data set.

I
Electric Reliability Data Collection Process and Calculations

Data Collection – Methods and Issues

This appendix discusses data collection methods and issues. It explains how the various data were collected. Changes in methods from prior reporting periods are highlighted and the impact of the new method on data accuracy is discussed.

In April 2013, PSE implemented the new OMS and CIS which replaced the functionality provided by the outage management system included in CLX. The CIS and SAP systems replace the functionality provided by CLX in recording PSE's customer inquiries concerning reliability and power quality. Due to change in data sources and business processes with the OMS, PSE recognizes that data integrity will be affected for a period of time until business processes and systems are stabilized. Starting in the second quarter of 2015, one year after implementation of the OMS, PSE began analyzing the data to identify data impact changes. This analysis continues.

Methods for Identifying when a Sustained Interruption Begins

The following methods are used to determine the beginning point of an interruption:

- A customer calls to PSE's Customer Care Center, either through the automated voice response unit or talking with a customer representative.
- A customer calls to a PSE employee rather than through the Customer Care Center.
- A customer logging into their online PSE account and reporting an outage.
- A substation breaker operation that is reflected in the OMS based on a SCADA interface.

Possible Causes of Data Inconsistencies:

- If service to a customer affected by a service interruption remains out after the interruption has been corrected, a follow-up call from the customer may be reported as a new incident.
- Data entry mistakes can create inconsistencies.
- During a major storm event, the focus is on ensuring a safe environment for the responders and restoring customers as quickly as possible. While outage information is recorded, given the magnitude of the event and number of outages, the records may not accurately report the extent of the outage or if customers were systematically restored.

Methods to Specify When the Duration of a Sustained Interruption Ends

The following methods are used to determine the ending point of an interruption:

- PSE Service personnel will log the time when customers are restored.
- SCADA provides a signal to the OMS that a substation breaker has been restored.

Possible Causes of Data Inconsistencies:

- Multiple layers of issues may be contributing to a Sustained Interruption for a specific customer as described in the definition of Duration of Sustained Interruption.
- Data entry errors can affect the accuracy of the information.
- Getting consistent feedback from the field personnel responding to the outage.
- During a major storm event, the focus is on ensuring a safe environment for the responders and restoring customers as quickly as possible. While outage information is recorded, given the magnitude of the event and number of outages, the records may not accurately report the extent of the outage or if customers were systematically restored.

Recording Cause Codes

Outage cause codes are reported by the PSE service personnel responding to the outage location.

Possible Causes of Data Inconsistencies:

- During a major storm event, the focus is on ensuring a safe environment for the responders and restoring customers as quickly as possible. While outage information is recorded, given the magnitude of the event and number of outages, the records may not accurately report the extent of the outage or if customers were systematically restored.
- Restoration efforts take precedence over pinpointing the exact cause and location of the outage, especially in cross-country terrain or in darkness.

Recording and Tracking Customer Complaints

The CSR in PSE's Customer Care Center handling the call listens for key words and then categorizes the customer comments accordingly.

- The CSR creates a Service Miscellaneous request for the appropriate PSE personnel to contact the customer and discuss their concerns.
- All contact is tracked as an interaction record in PSE's Customer Information System (CIS) and Service Miscellaneous Notification in PSE's SAP System and counted as a Customer Inquiry for electric reliability reporting purposes.
- When two or more Customer Inquiries on outage frequency or duration and/or power quality have been recorded in SAP from a customer during current and prior reporting year, these Customer Inquiries together will be considered as a PSE "Customer Complaint."

Possible Causes of Data Inconsistencies:

- Data entry errors from the initial inquiry or during the feedback loop can affect the accuracy of the information.
- High volumes of customer inquiries, during storms for example, may increase likelihood of data entry errors.

Change in Definitions and Calculations

This section describes the methodology used in defining and calculating reliability metrics, which are then used to evaluate performance. The UTC in WAC 480-100-398 (2) requires a utility to report changes made in this methodology including data collection and calculation of reliability information after the initial baselines are set. The utility must explain why the changes occurred and how the change is expected to affect comparisons of the newer and older information.

Change to Include the IEEE Methodology

In the 2004 Annual Electric Service Reliability Report, PSE indicated that starting in 2005, reliability metrics using the IEEE standard 1366 methodology as a guideline would be included. This change and other modifications for monitoring and reporting electric service reliability information were adopted by PSE in UE-060391. The purpose for moving to the IEEE standard 1366 methodology is to

- Provide uniformity in reliability indices
- Identify factors which affect these indices
- Aid in consistent reporting practices among utilities

T_{MED} (Major Event Day Threshold) is the reliability index that facilitates this consistency. A detailed equation for calculating T_{MED} is provided in Appendix H: *Electric Reliability Terms and Definitions*.

While the IEEE guidelines provide a standard for the industry, companies can create a variety of definitions of an outage or sustained outage.

- PSE defines sustained outages as those lasting longer than one minute
- IEEE defines a sustained outage to be longer than five minutes

PSE will continue to use the one minute definition as PSE believes that tracking shorter duration outages allows us to better monitor the performance of the electric system and subsequently assess potential system improvements. It is also consistent with the definition of an outage used in the SQI methodology.

Changes for 2010 and Subsequent Years Reporting

In 2010, PSE met with the UTC staff to enhance the format of the Electric Service Reliability report and the reliability statistics information provided. Specific enhancements included clarification of baseline statistics and detailed comparison of and expanded set of reliability metrics. This annual report reflects all these reporting enhancements and the SQI SAIDI performance and benchmark calculation changes approved by the UTC.

Baseline Data Reliability Statistics

Pursuant to the WAC Electric Service Reliability requirements, PSE establishes 2003 as its baseline year as the performance from the year was about average for each of the reliability measurements. However, PSE would rather develop a baseline using multiple years to mitigate the fluctuation of weather conditions and other external factors. PSE feels there is limited usefulness in designating one specific year's information as a "baseline" and cautions against the use of a single year's data to assess year-to-year system reliability trends.

Timing of Annual Report Filings

PSE will be reporting data and information on a calendar year basis. PSE's annual Electric Service Reliability report will be filed as part of the annual SQI and Electric Service Reliability report with the UTC no later than the end of March of each year.[43]

Tree-related Outage Codes

PSE conducted a review of tree-related outages and the use of the tree on-right-of-way (TO) and tree off-right-of-way (TF) cause codes on outage notifications. However, it was found that during an outage it was difficult for field personnel to accurately assess the correct use of TF and TO cause codes.

As a result, PSE created a new outage cause code, Trees/Vegetation (TV) and revised the tree-related outage coding process. After a tree-related outage has occurred on a transmission line or causes a complete distribution circuit outage, a certified arborist field-verifies if the tree was on or off right-of-way and the correct code is added to the outage notification. All other tree-related outages are coded as TV.

PSE complaints

The business process for recording customer inquiries changed with the new CIS implementation. For the 2014 reporting, PSE used the Service Notification (SM) records pertaining to outage duration/frequency or power quality for reporting the number of PSE complaints for the last two calendar years. PSE feels that using this new method of data collection provides a more complete assessment of customer inquiries pertaining to reliability and power quality concern.

[43] Order 17 of consolidated Docket Numbers UE-072300 and UG-072301, page 10, section 26.

Areas of Greatest Concern

This section of the annual reporting includes information on specific areas PSE is targeting for specific actions to enhance the level of service reliability. For 2016, PSE designates the Areas of Greatest Concern as the Top 50 worst-performing circuits[44] over the previous five years that rank worst in terms of customer interruption minutes.

- Each circuit is first ranked by the annual total customer interruption minutes seen by the circuit for each of the previous five years.
- The yearly ranking results are then averaged to determine the overall Top 50 worst-performing circuits over the past five years.

The following information will be reported on each of these areas:

- Identification of each Area of Greatest Concern.
- Explanation of the specific actions PSE plans to take in each Area of Greatest Concern to improve the service in each area during the coming year.

Exclusion Events

Per Docket Number UE-072300, PSE can petition to exclude certain annual results or outage minutes from the performance calculation for the current year and years following that will be affected. PSE must demonstrate that event was unusual or extraordinary and that PSE's level of preparedness and response was reasonable. The UTC has granted the following events to be considered extraordinary:

- Total SAIDI results for 2006.
- January 2012 storm event.

PSE has petitioned the following events be considered extraordinary:

- August 2015 storm event
- November 2015 storm event

[44] This definition of Areas of Concern became effective in 2012 considering the trend in system performance based on circuits that exceed the SQI, number of customers affected by those circuits and the number of complaints.

J
Current Year Electric Service Outage by Cause by Area

This appendix details the 2015 Outage Cause by County. In Tables J1 through J3 color codes indicate which major outage category the outage cause is grouped into. The Cause Code definitions can be found in Appendix H: *Electric Reliability Terms and Definitions*.

Table J1: Color Code Legend

Color Code Legend
Preventable
Third Party (Non-Tree)
Tree-related

Table J2: Total Outages by Cause

	Northern			King/Kittitas		Southern/Western			
	Whatcom	Skagit	Island	King	Kittitas	Pierce	Thurston	Kitsap	Total
AO	31	29	8	99	3	28	28	23	249
BA	194	125	69	966	32	156	219	237	1,998
CP	25	32	11	113	3	28	39	30	281
CR	2	2	0	58	0	11	16	2	91
DU	16	3	4	115	7	20	22	20	207
EF	646	369	260	1,980	93	394	681	519	4,942
EO	29	6	4	65	8	12	20	15	159
EQ	0	0	0	0	0	0	0	0	0
FI	8	4	1	16	1	3	9	5	47
LI	3	1	1	29	6	7	13	3	63
SO	163	113	54	636	31	108	161	162	1,428
TF	7	2	1	43	0	6	16	53	128
TO	2	3	2	13	0	4	1	9	34
TV	646	457	440	2,040	49	417	558	1,369	5,976
UN	54	51	26	290	4	64	52	102	643
VA	1	0	0	13	1	1	1	1	18
Misc[Note]	39	6	4	104	8	34	11	22	228
Total	1,866	1,203	885	6,580	246	1,293	1,847	2,572	16,492

Note: Miscellaneous causes are included in both Preventable and Third Party (Non-Tree) categories

Table J3: 5% Exclusion Outages by Cause (non-major storm)

	Northern			King/Kittitas		Southern/Western			
	Whatcom	Skagit	Island	King	Kittitas	Pierce	Thurston	Kitsap	Total
AO	31	27	8	97	3	27	26	23	242
BA	189	119	66	932	30	155	217	236	1,944
CP	25	28	11	107	3	27	38	28	267
CR	2	2	0	54	0	11	16	2	87
DU	15	3	4	112	6	19	21	19	199
EF	566	330	223	1,809	86	349	604	460	4,427
EO	27	5	4	65	8	11	19	12	151
EQ	0	0	0	0	0	0	0	0	0
FI	4	3	1	14	0	2	6	5	35
LI	1	0	1	24	6	6	11	3	52
SO	157	110	52	617	30	108	160	157	1,391
TF	7	2	1	36	0	5	8	45	104
TO	2	2	2	13	0	0	1	6	26
TV	223	182	126	792	26	154	285	438	2,226
UN	47	45	19	240	4	46	37	72	510
VA	0	0	0	13	1	1	1	1	17
Misc[Note]	33	6	3	84	7	16	9	13	171
Total	1,329	864	521	5,009	210	937	1,459	1,520	11,849

Note: Miscellaneous causes are included in both Preventable and Third Party (Non-Tree) categories

K
Historical SAIDI and SAIFI by Area

This appendix details in Table K1, the three-year history of SAIDI and SAIFI data by county.

Table K1: SAIDI and SAIFI Data for the Past Three Years by County [Note]

Region/County	Year	SAIFI Total	SAIFI Total 5-year Average	SAIFI 5%	SAIFI IEEE	SAIDI Total	SAIDI Total 5-year Average	SAIDI 5%	SAIDI IEEE
Northern									
Whatcom	2015	2.07	1.15	1.15	1.07	1056	332	157	154
	2014	1.57	0.90	1.26	1.08	314	162	235	181
	2013	0.66	0.80	0.64	0.65	100	145	95	97
Skagit	2015	2.11	1.77	1.18	1.12	948	454	203	177
	2014	2.07	1.55	1.50	1.42	493	318	333	274
	2013	1.85	1.32	1.71	1.74	322	284	278	281
Island	2015	2.05	1.60	0.81	0.91	1430	611	159	209
	2014	2.95	1.52	1.23	1.36	1197	443	233	272
	2013	1.27	1.62	1.01	1.05	187	298	132	138
King/Kittitas									
King	2015	1.92	1.23	0.94	0.91	597	325	151	149
	2014	1.72	1.10	0.86	0.83	590	269	135	120
	2013	1.00	0.93	0.68	0.69	221	181	101	103
Kittitas	2015	1.21	1.80	1.00	1.02	289	278	214	218
	2014	2.94	1.89	2.26	2.29	639	264	428	520
	2013	1.47	1.81	1.27	1.27	198	215	164	167

Note: Reported figures are based on most current SAP outage data, as of February 2016.

Table continues on next page.

Region/County	Year	SAIFI Total	SAIFI Total 5-year Average	SAIFI 5%	SAIFI IEEE	SAIDI Total	SAIDI Total 5-year Average	SAIDI 5%	SAIDI IEEE
Southern/Western									
Pierce	2015	1.95	1.24	0.84	0.73	433	211	110	81
	2014	1.70	1.16	1.05	1.12	290	201	147	128
	2013	0.90	1.07	0.81	0.81	137	179	120	120
Thurston	2015	1.39	1.34	0.88	0.77	382	276	169	133
	2014	1.67	1.48	0.89	0.68	498	358	168	113
	2013	0.90	1.47	0.81	0.81	137	317	134	143
Kitsap	2015	4.69	2.68	2.40	2.22	1715	658	400	299
	2014	2.87	2.43	1.45	1.44	607	655	197	213
	2013	2.02	2.26	1.39	1.37	324	593	150	154

L
1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements

This appendix presents PSE SAIFI and SAIDI performance from 1997 through the current year using different measurements.

Figure L1: 1997–2015 SAIFI Performance by Different Measurements

1997-2015 PSE SAIFI Performance in Different Measurements
(Average number of interruptions per year per customer)

Calendar Year	(a) Annual SAIFI Excluding Any Days That 5% or More Customers Are w/o Power	(b) Annual IEEE SAIFI Excluding Daily Results over T_{MED}	(c) Annual Total SAIFI Results: No Exclusions	(d) Annual Total SAIFI Results with Exclusions	(e) Total SAIFI 5-Year Rolling Annual Average with Exclusions
1997	1.04	1.11	1.53	1.53	
1998	0.85	0.92	1.42	1.42	
1999	0.98	0.96	1.88	1.88	
2000	0.85	0.91	1.32	1.32	
2001	0.98	0.79	1.34	1.34	1.50
2002	0.83	0.80	1.07	1.07	1.41
2003	0.80	0.71	1.24	1.24	1.37
2004	0.77	0.77	1.09	1.09	1.21
2005	0.94	0.93	1.18	1.18	1.18
2006	1.23	1.05	2.52		
2007	0.98	0.91	1.42	1.42	1.20
2008	1.01	0.98	1.12	1.12	1.21
2009	1.09	0.94	1.24	1.24	1.22
2010	0.86	0.87	1.59	1.59	1.31
2011	1.02	1.02	1.07	1.07	1.29
2012	0.92	0.83	1.62	0.92	1.19
2013	0.86	0.86	1.13	1.13	1.19
2014	1.05	1.00	1.89	1.89	1.32
2015	1.11	1.04	2.18	2.18	1.44

Figure L2: 1997–2015 SAIFI Performance by Different Measurements

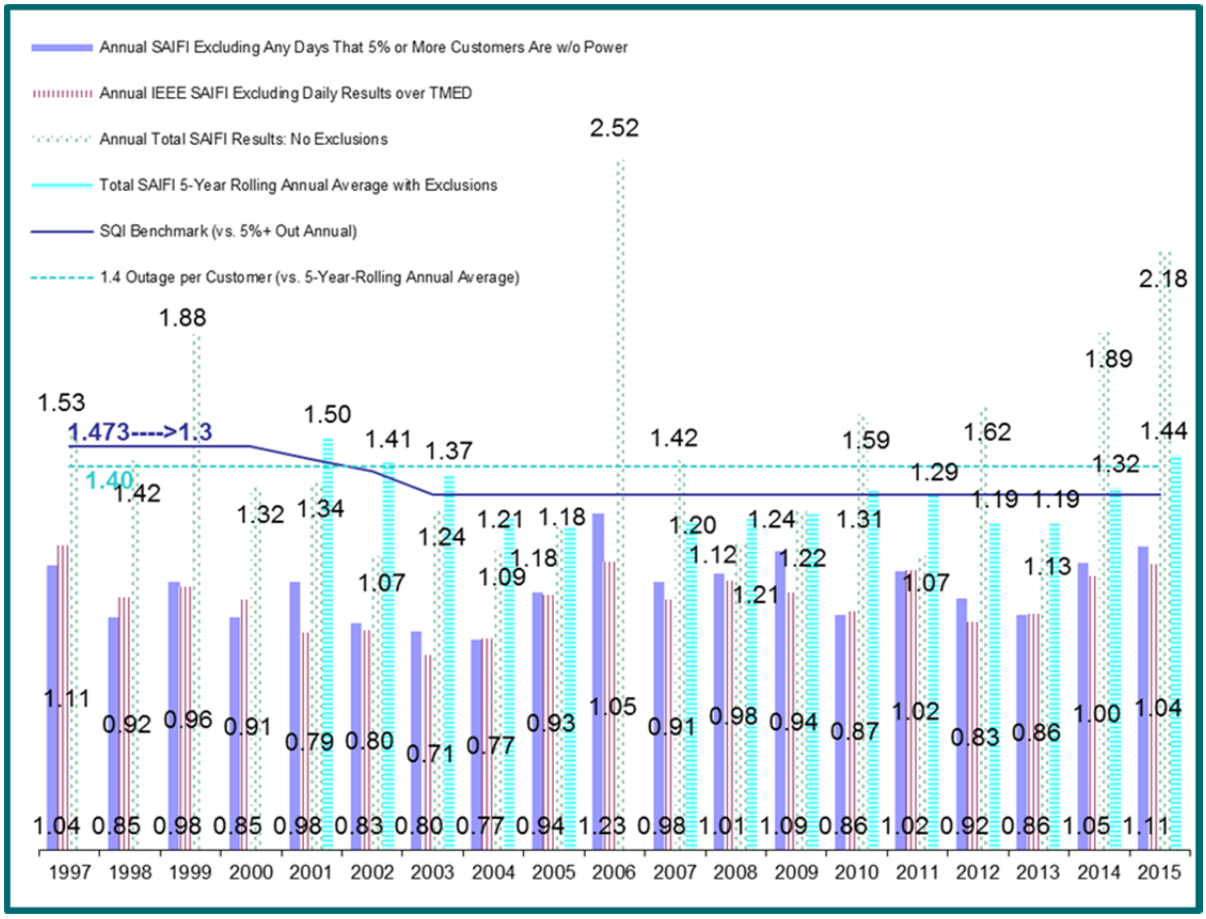


Figure L3: 1997–2015 SAIDI Performance by Different Measurements

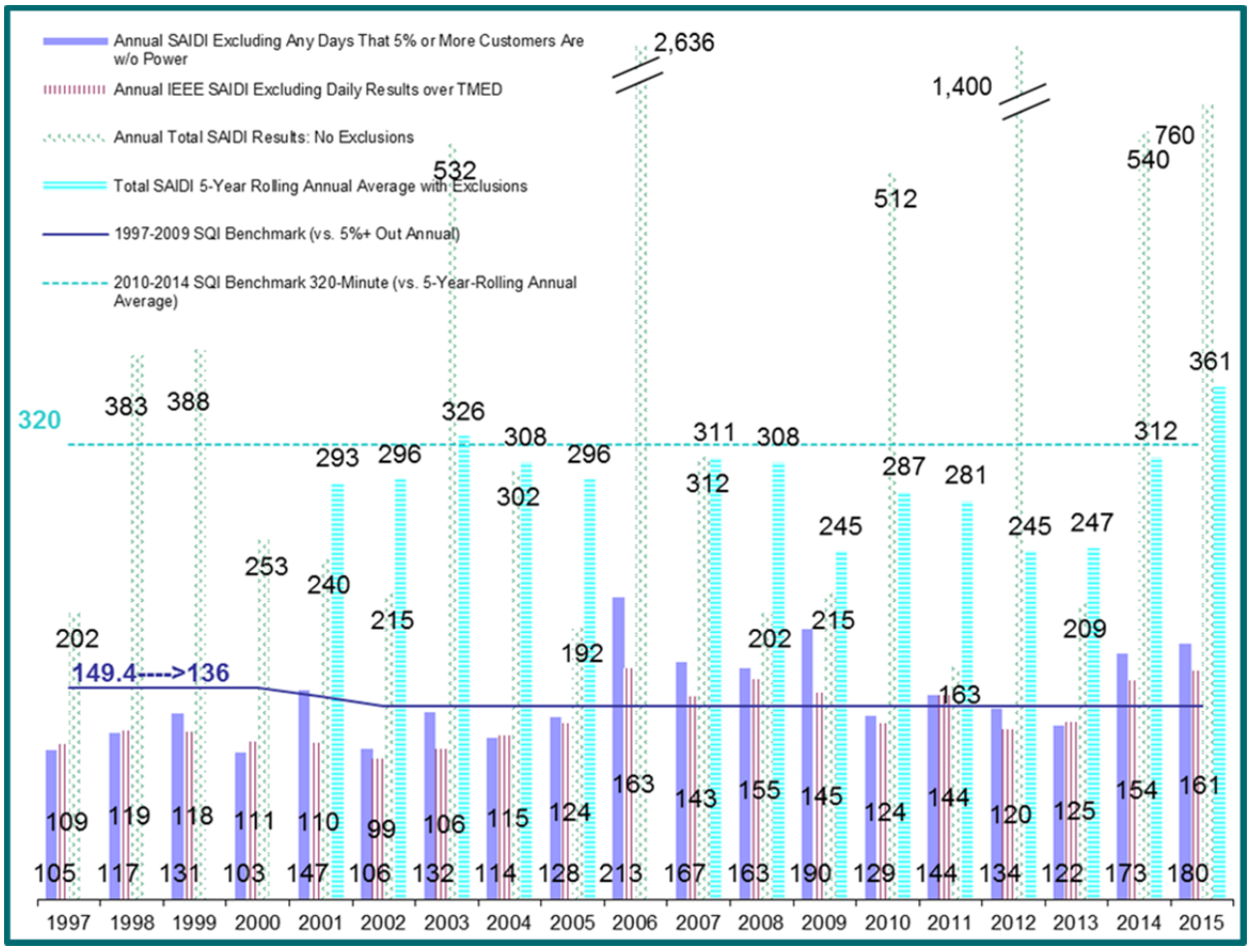
1997-2015 PSE SAIDI Performance in Different Measurements

(Average number of outage minutes per customer per year)

Calendar Year	(a) Annual SAIDI Excluding Any Days That 5% or More Customers Are w/o Power	(b) Annual IEEE SAIDI Excluding Daily Results over T_{MED}	(c) Annual Total SAIDI Results: No Exclusions	(d) Annual Total SAIDI Results with Exclusions	(e) Total SAIDI 5-Year Rolling Annual Average with Exclusions
1997	105	109	202	202	
1998	117	119	383	383	
1999	131	118	388	388	
2000	103	111	253	253	
2001	147	110	240	240	293
2002	106	99	215	215	296
2003	132	106	532	532	326
2004	114	115	302	302	308
2005	128	124	192	192	296
2006	213	163	2,636		
2007	167	143	312	312	311
2008	163	155	202	202	308
2009	190	145	215	215	245
2010	129	124	512	512	287
2011	144	144	163	163	281
2012	134	120	1,400	134[1]	245
2013	122	125	209	209	247
2014	173	162	540	540	312
2015	180	163	760	760	361

[1] Per UTC approval, excludes the January 2012 Storm Event

Figure L4: 1997–2015 SAIDI Performance by Different Measurements



M
Current-Year Commission and Rolling Two-Year PSE Customer Electric Service Reliability Complaints with Resolutions

This appendix lists, in Tables M1 and M2, the current-year UTC and rolling two-year PSE customer electric service reliability complaints with resolutions.

Table M1: Current Year Commission Complaints

No.	Complaint Type	Date of Complaint	Location	Closing Date
1	Reliability	1/14/2015	Bellevue	3/3/2015
2	Reliability	1/20/2015	Bellevue	2/27/2015
3	Reliability	2/6/2015	Bellevue	2/26/2015
4	Reliability	2/6/2015	Bellevue	2/24/2015
5	Reliability	3/17/2015	Bellevue	4/1/2015
6	Reliability	8/12/2015	Olympia	1/25/2016
7	Reliability	9/10/2015	Redmond	12/1/2015
8	Reliability	9/14/2015	Bellevue	10/19/2015
9	Reliability	10/15/2015	Kent	11/10/2015
10	Reliability	11/2/2015	Mercer Island	11/9/2015
11	Reliability	11/5/2015	Clyde Hill	11/13/2015
12	Reliability	11/6/2015	Clyde Hill	11/12/2015
13	Reliability	11/6/2015	Clyde Hill	11/12/2015
14	Reliability	11/12/2015	Spanaway	11/25/2015
15	Reliability	11/17/2015	Bainbridge Island	1/5/2016
16	Reliability	11/20/2015	Kenmore	1/5/2016
17	Reliability	11/20/2015	Kenmore	12/18/2015
18	Reliability	11/24/2015	Bremerton	12/14/2015
19	Reliability	12/7/2015	Olympia	1/5/2016
20	Reliability	12/14/2015	Bremerton	1/20/2016
21	Reliability	12/15/2015	Kenmore	2/17/2016
22	Reliability	12/15/2015	Kenmore	1/15/2016

No.	Complaint Type	Date of Complaint	Location	Closing Date
23	Reliability	12/23/2015	Bremerton	1/5/2016
24	Power Quality	3/27/2015	Port Orchard	6/19/2015
25	Power Quality	6/11/2015	Oak Harbor	7/2/2015
26	Power Quality	11/16/2015	Bellingham	12/8/2015
27	Power Quality	12/1/2015	Puyallup	12/8/2015

Table M2: Rolling Two-Year PSE Customer Electric Service Reliability Complaints with Resolutions (Sorted by County)

No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response	Action by PSE
1	Island	Mar 2015 Mar 2015	Clinton	Power Quality	Langely-16	Contacted customer to discuss concerns.	Ongoing circuit maintenance and monitoring will continue.
2	Island	Dec 2014 Dec 2014 Mar 2015	Freeland	Reliability	Freeland-15	Contacted customer to discuss concerns.	A system project completed in 2015 should improve reliability improvement. Ongoing circuit maintenance and monitoring will continue.
3	King	Jan 2014 Jan 2014	Auburn	Reliability	Edgewood-12	Reported in 2014. No new inquiries in 2015.	A system project is being evaluated for feasibility and cost effectiveness. Ongoing circuit monitoring and maintenance will continue.
4	King	Feb 2014 Jul 2014	Bellevue	Reliability	Clyde Hill-23	Reported in 2014. No new inquiries in 2015.	A system project with estimated completion in 2016 should improve reliability. Ongoing circuit maintenance and monitoring will continue.
5	King	Dec 2014 Jan 2015	Bellevue	Power Quality	Eastgate-12	Contacted customer to discuss concerns.	On-going circuit maintenance and monitoring will continue.
6	King	Oct 2014 Nov 2014	Bellevue	Reliability	Factoria-13	Reported in 2014. No new inquiries in 2015.	A system project is being evaluated for feasibility and cost effectiveness. Ongoing circuit monitoring and maintenance will continue.

Table continues on next page

No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response	Action by PSE
7	King	Oct 2014 Oct 2014	Bellevue	Reliability	Lake Hills-22	Reported in 2014. No new inquiries in 2015.	Two system projects completed in 2015 should provide reliability improvement. Ongoing circuit maintenance and monitoring will continue.
8	King	Jan 2015 Feb 2015 Feb 2015	Bellevue	Power Quality	Somerset-15	Contacted customer to discuss concerns.	PSE checked the Primary Meter and secondary voltage of the customer owned distribution system and found nothing abnormal. The system disturbances are only impacting the customer so PSE anticipates the problem is within their system. On-going circuit maintenance and monitoring will continue.
9	King	Mar 2015 Mar 2015	Burien	Reliability	North Normandy-12	Contacted customer to address concerns.	A system project was completed 2015 and another system project with estimated completion in 2016 should improve reliability. Ongoing circuit maintenance and monitoring will continue.
10	King	Nov 2014 Nov 2014	Duvall	Reliability	Duvall-12	Reported in 2014. No new inquiries in 2015.	Ongoing circuit maintenance and monitoring will continue.
11	King	Nov 2014 Jan 2015	Fall City	Reliability	Snoqualmie-13	Contacted customer to discuss concerns.	On-going circuit maintenance and monitoring will continue.
12	King	Mar 2014 Oct 2014	Issaquah	Reliability	Mirrormont-13	Reported in 2014. No new inquiries in 2015.	On-going circuit maintenance and monitoring will continue.
13	King	Jul 2015 Aug 2015	Kenmore	Reliability	Kenmore-27	Contacted customer to discuss concerns.	Two system projects are with estimated completion in 2016 should improve reliability. Ongoing circuit monitoring and maintenance will continue.

Table continues on next page

No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response	Action by PSE
14	King	Aug 2015 Aug 2015	Kent	Reliability	Lake Meridian-13	Contacted customer to address concerns.	A system project with estimated completion in 2016 should improve reliability. Ongoing circuit monitoring and maintenance will continue.
15	King	Jan 2014 Oct 2014	Kirkland	Reliability	Inglewood-15	Reported in 2014. No new inquiries in 2015.	A system project with estimated completion in 2016 which will improve reliability. Ongoing circuit monitoring and maintenance will continue.
16	King	Jan 2014 Feb 2014 Oct 2015	Kirkland	Reliability	Juanita-14	Reported in 2014. One new inquiry in 2015.	Ongoing circuit maintenance and monitoring will continue.
17	King	Aug 2015 Oct 2015	Kirkland	Reliability	Wayne-16	Contacted customer to discuss concerns.	Ongoing circuit maintenance and monitoring will continue.
18	King	Sep 2014 Oct 2014	Redmond	Power Quality	Plateau-21	Reported in 2014. No new inquiries in 2015.	Ongoing circuit maintenance and monitoring will continue.
19	King	Nov 2014 Dec 2015	Redmond	Reliability	Sahalee-17	Contacted customer to discuss concerns.	A system project is being evaluated for feasibility and cost effectiveness. Ongoing circuit monitoring and maintenance will continue.
20	King	Jun 2015 Jul 2015	Renton	Reliability	Fairwood-14	Contacted customer to address concerns.	A system project was completed in 2015 which provide reliability improvement. Ongoing circuit maintenance and monitoring will continue.

Table continues on next page

No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response	Action by PSE
21	King	Sep 2015 Oct 2015	Renton	Reliability	Highlands-16	Contacted customer to discuss concerns.	Ongoing circuit maintenance and monitoring will continue.
22	King	Aug 2015 Dec 2015	Renton	Reliability	Lake McDonald-23	Contacted customer to discuss concerns.	On-going circuit maintenance and monitoring will continue.
23	King	Jan 2015 Dec 2015	Snoqualmie Pass	Reliability	Hyak-13	Contacted customer to discuss concerns.	Two system projects completed in 2014 and 2015 should improve reliability. Ongoing circuit monitoring and maintenance will continue.
24	King	Jun 2015 Jun 2015 Jul 2015	Woodinville	Power Quality	Hollywood-25	Contacted customer to discuss concerns.	A system project with estimated completion in 2016 should improve reliability. Ongoing circuit monitoring and maintenance will continue.
25	King	Sep 2015 Oct 2015	Woodinville	Reliability	Hollywood-26	Contacted customer to discuss concerns.	Ongoing circuit maintenance and monitoring will continue.
26	Kitsap	Nov 2014 Nov 2014	Bainbridge Island	Reliability	Port Madison-15	Reported in 2014. No new inquiries in 2015.	A system project with estimated completion in 2016 and another system project with estimated completion in 2017 should improve reliability. Ongoing circuit maintenance and monitoring will continue.
27	Kitsap	Dec 2014 Nov 2015 Nov 2015	Bainbridge Island	Reliability	Port Madison-16	Contacted customer to discuss concerns.	A system project with estimated completion in 2016 should improve reliability. Ongoing circuit maintenance and monitoring will continue.

Table continues on next page

No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response	Action by PSE
28	Kitsap	Nov 2014 Dec 2014	Bainbridge Island	Reliability	Winslow-13	Reported in 2014. No new inquiries in 2015.	Two system projects were completed in 2015 and another system project planned for 2017 should improve reliability. Ongoing circuit monitoring and maintenance will continue.
29	Kitsap	Dec 2014 Nov 2015	Bainbridge Island	Power Quality	Winslow-13	Contacted customer to discuss concerns.	Two system projects were completed in 2015 and another system project planned for 2017 should improve reliability. Ongoing circuit monitoring and maintenance will continue.
30	Kitsap	Aug 2015 Nov 2015	Bainbridge Island	Reliability	Winslow-16	Contacted customer to discuss concerns.	A system project is being evaluated for feasibility and cost effectiveness. Ongoing circuit monitoring and maintenance will continue.
31	Kitsap	Nov 2015 Dec 2015	Bremerton	Reliability	Chico-12	Contacted customer to discuss concerns.	Ongoing circuit monitoring and maintenance will continue.
32	Kitsap	Dec 2015 Dec 2015	Bremerton	Reliability	Chico-12	Contacted customer to discuss concerns.	Ongoing circuit monitoring and maintenance will continue.
33	Kitsap	Nov 2015 Nov 2015	Bremerton	Reliability	Chico-13	Contacted customer to discuss concerns.	A system project with estimated completion in 2016 should improve reliability. Ongoing circuit maintenance and monitoring will continue.
34	Kitsap	Mar 2015 Mar 2015	Poulsbo	Reliability	Central Kitsap-14	Contacted customer to discuss concerns.	On-going circuit maintenance and monitoring will continue.

Table continues on next page

No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response	Action by PSE
35	Kitsap	Nov 2015 Dec 2015	Poulsbo	Reliability	South Keyport-22	Contacted customer to discuss concerns.	On-going circuit maintenance and monitoring will continue.
36	Kitsap	Dec 2015 Dec 2015	Seabeck	Reliability	Chico-12	Contacted customer to discuss concerns.	A system project completed in 2015 and a system project with estimated completion in 2016 should improve reliability. Ongoing circuit maintenance and monitoring will continue.
37	Kitsap	Mar 2014 Jul 2014	Seabeck	Reliability	Chico-12	Reported in 2014. No new inquiries in 2015.	A system project completed in 2015 should improve reliability. Ongoing circuit maintenance and monitoring will continue.
38	Kitsap	Nov 2015 Nov 2015	Silverdale	Reliability	Central Kitsap-14	Contacted customer to discuss concerns.	On-going circuit maintenance and monitoring will continue.
39	Pierce	Nov 2015 Nov 2015	Bonney Lake	Reliability	Bonney Lake-15	Contacted customer to discuss concerns.	A system project is being evaluated for feasibility and cost effectiveness. Ongoing circuit monitoring and maintenance will continue.
40	Pierce	Jul 2015 Aug 2015	Lake Tapps	Reliability	Lake Tapps-18	Contacted customer to discuss concerns.	Two system projects with estimated completion in 2016 will provide reliability improvement. Ongoing circuit maintenance and monitoring will continue.
41	Pierce	Dec 2014 Aug 2015	Lakewood	Reliability	Gravelly Lake-16	Contacted customer to discuss concerns.	On-going circuit maintenance and monitoring will continue.
42	Skagit	Nov 2014 Oct 2015	Concrete	Reliability	Hamilton-15	Contacted customer to discuss concerns.	A system project completed in 2014 should improve reliability. Ongoing circuit maintenance and monitoring will continue.

Table continues on next page

No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response	Action by PSE
43	Thurston	Jun 2015 Aug 2015 Aug 2015	Olympia	Reliability	Griffin-15	Contacted customer to discuss concerns.	A system project completed in 2015 should improve reliability. Ongoing circuit maintenance and monitoring will continue.
44	Thurston	Aug 2015 Nov 2015	Olympia	Reliability	McAllister-16	Contacted customer to discuss concerns.	A system project with estimated completion in 2016 should improve reliability. Ongoing circuit maintenance and monitoring will continue.
45	Thurston	Jul 2015 Oct 2015	Rochester	Reliability	Rochester-15	Contacted customer to discuss concerns.	On-going circuit maintenance and monitoring will continue.
46	Thurston	Sep 2015 Nov 2015	Rochester	Reliability	Rochester-17	Contacted customer to discuss concerns.	A system project completed in 2015 and a system project with estimated completion in 2016 should improve reliability. Ongoing circuit maintenance and monitoring will continue.
47	Thurston	May 2015 Jun 2015 Jul 2015	Roy	Power Quality	Longmire-25	Contacted customer to discuss concerns.	Ongoing circuit maintenance and monitoring will continue.
48	Whatcom	Feb 2015 Mar 2015	Bellingham	Power Quality	Woburn-23	Contacted customer to discuss concerns.	Ongoing circuit maintenance and monitoring will continue.
49	Whatcom	Oct 2015 Oct 2015	Lynden	Reliability	Vista-26	Contacted customer to discuss concerns.	A system project is being evaluated for feasibility and cost effectiveness. Ongoing circuit monitoring and maintenance will continue.

N
Areas of Greatest Concern with Action Plan

This appendix details the areas of greatest concern with an action plan.

CMI refers to Customer Minutes of Interruptions.

Table N1 provides the 2015 and 2014 list of the Top 50 Worst-Performing Circuits in the PSE territory. The thirteen circuits that dropped off in 2015 are listed at the bottom of the table and noted as "Not on 2015 Top 50 List". The thirteen circuits that are new in 2015 are noted as "Not on 2014 Top 50 List."

Table N1: 2015 and 2014 Year End 50 Worst-Performing Circuits

Circuit	County	2015 Year End 5 Year Avg Rank	2015 Year End Average Total CMI	2014 Year End 5 Year Avg Rank	2014 Year End Average Total CMI	Action by PSE
Chico-12	Kitsap	1	5,690,841	1	4,231,654	Completed recloser and three phase feeder extension project in 2010. Completed enhanced tree pruning pilot project in 2012. Underground system improvement project completed in 2015. Installed a second 7.5 MVA autotransformer allowing for a second feeder tie. Tollgrade sensors are planned for installation in 2016.
Cottage Brook-13	King	2	3,609,904	5	2,925,368	Completed an underground conversion project and installed a recloser in 2011. Underground conversion project completed in 2015. Two cable remediation projects completed in 2014 and three cable remediation projects completed in 2015. Tollgrade sensors planned for installation in 2016. One cable remediation project planned for 2016.
Orting-22	Pierce	3	4,627,492	10	3,973,522	Completed the reconductor of overhead line to tree wire in 2010 and 2012. Completed a feeder tie in 2010. Installed recloser in 2011. A new substation bank installed 2014. Completed one cable replacement project in 2015. Two system improvement projects planned for 2016.
Longmire-17	Thurston	4	3,175,923	11	2,573,737	Reconfigured Longmire-22 and Longmire-17 in 2009 to better segregate customers. Completed reconductor of overhead line to tree wire and underground conversion project in 2012. One cable remediation project planned for 2016.

Circuit	County	2015 Year End 5 Year Avg Rank	2015 Year End Average Total CMI	2014 Year End 5 Year Avg Rank	2014 Year End Average Total CMI	Action by PSE
Vashon-13	King	5	2,124,812	4	2,024,968	Completed two underground cable remediation projects in 2009 and 2010 and two reconductor projects in 2010. Installed two gang operated switches and a recloser in 2011. Tree wire projects were completed in 2014. Planning is currently reviewing system reliability projects for future construction.
Silverdale-15	Kitsap	6	3,188,025	8	2,092,109	Completed one underground cable remediation project in 2009. Installed one recloser and two gang operated switches in 2011. Installed two reclosers in 2014. Reconductor of entire overhead line to tree wire by 2017: phase 1 was completed 2014, phase two planned for 2016, and phase three planned for 2017.
Vashon-23	King	7	2,219,733	7	2,156,738	Installed recloser in 2010. Two tree wire projects and underground conversion project completed in 2014. One tree wire project has been identified for 2017 funding consideration.
Marine View-13	King	8	2,044,847	6	2,091,590	Completed reconductor of overhead line to tree wire and installed recloser in 2014. A system project has been identified for 2017 funding consideration.
Prine-13	Thurston	9	3,368,173	2	3,951,479	Installed two reclosers and switches in 2010. Reconductor of overhead line to tree wire completed in 2015. One cable remediation project to be completed in 2016.
Freeland-12	Island	10	2,975,056	26	1,790,524	Phase balancing and fuse coordination in East Harbor area completed in 2014. One underground cable remediation project completed in 2014. One underground cable remediation project planned for 2016.

Circuit	County	2015 Year End 5 Year Avg Rank	2015 Year End Average Total CMI	2014 Year End 5 Year Avg Rank	2014 Year End Average Total CMI	Action by PSE
Baker River Switch-24	Skagit	11	1,873,195	9	2,022,951	One underground conversion project completed in 2009. Installed recloser in 2011 and three switches in 2010. Two underground conversion projects completed in 2013. One underground conversion project completed in 2014. Tollgrade sensors planned for installation in 2016.
Vashon-12	King	12	1,986,562	3	2,865,252	Installed recloser in 2009. Completed an underground cable remediation project in 2010. Installed three gang operated switches in 2011. Underground conversion and tree wire projects completed in 2014.
Big Rock-15	Skagit	13	2,405,405	29	1,361,903	Completed a pole replacement project in 2009. Recloser installed in 2013. Planning is currently reviewing system reliability projects for future construction.
Hickox-16	Skagit	14	1,655,885	28	1,159,063	Completed wildlife diversion and pole replacement projects in 2007, a recloser project in 2011, and reconductor of overhead line to tree wire in 2013. Planning is currently reviewing and identifying potential reliability improvements projects.
Duvall-12	King	15	2,654,730	19	2,473,830	Installed three overhead switches in 2013. Completed an overhead reconductor project in 2014. One cable remediation project completed in 2015. One cable remediation project to be completed in 2016. Planning is currently reviewing system reliability projects for future construction.
Soos Creek-25	King	16	2,241,656	21	1,869,085	Installed recloser and completed reconductor of overhead line to tree wire in 2013. Two underground cable remediation projects completed in 2014. Future plans for Jenkins and Lake Holmes substations will improve reliability.

Circuit	County	2015 Year End 5 Year Avg Rank	2015 Year End Average Total CMI	2014 Year End 5 Year Avg Rank	2014 Year End Average Total CMI	Action by PSE
Kingston-24	Kitsap	17	2,481,825	20	1,714,494	Reconductor of overhead line to tree wire completed in 2013. A system project has been identified for 2017 funding consideration.
Kenmore-23	King	18	2,145,504	Not on 2014 Top 50 List		Planning is currently reviewing system reliability projects for future construction.
Hamilton-15	Skagit	19	2,013,980	32	1,164,744	Completed a reconductor of overhead line to tree wire in 2014. Two system improvement projects planned for 2016.
Cottage Brook-15	King	20	1,606,046	Not on 2014 Top 50 List		A Distribution Automation project planned for 2016.
Sherwood-18	King	21	3,224,204	13	3,459,409	Future plans for Lake Holm substation and overhead conversion will improve reliability. Substation construction dependent on area growth. One tree wire project was completed in 2015.
Duvall-15	King	22	1,504,068	Not on 2014 Top 50 List		A system project has been identified for 2017 funding consideration
Black Diamond-13	King	23	3,087,836	16	3,092,868	Future plans for Lake Holm substation and overhead conversion will improve reliability. Substation construction dependent on area growth. One underground cable remediation project was completed in 2015.
Hobart-15	King	24	2,234,142	17	2,534,960	Completed one feeder tie in 2011. One underground cable remediation project completed in 2014. Planning is currently reviewing system reliability projects for future construction.
Nugents Corner-26	Whatcom	25	1,502,974	35	1,134,315	Installed two reclosers in 2009 and 2011. Planning is currently reviewing and identifying potential reliability improvements projects

Circuit	County	2015 Year End 5 Year Avg Rank	2015 Year End Average Total CMI	2014 Year End 5 Year Avg Rank	2014 Year End Average Total CMI	Action by PSE
Hobart-16	King	26	2,323,012	15	2,446,658	Completed a feeder tie and cable remediation project in 2009 and an underground conversion job in 2013. Completed two underground cable remediation projects in 2014. One tree wire project completed in 2015.
Sequoia-16	King	27	2,650,730	12	2,830,198	Completed an underground cable remediation project in 2013. Two underground cable remediation projects planned for 2016.
Griffin-13	Thurston	28	1,428,015	27	1,360,801	Completed reconductor of overhead line to tree wire in 2012. Completed one underground cable remediation project in 2014 and two underground cable remediation projects scheduled in 2015. One recloser project planned for 2016. A system project has been identified for 2017 funding consideration.
Miller Bay-23	Kitsap	29	1,371,174	24	1,802,743	Completed reconductor of overhead line to tree wire in 2012 and 2013.
Fragaria-13	Kitsap	30	1,380,953	25	1,591,831	Completed two recloser projects in 2011. Reconductor of overhead line to tree wire completed in 2012. A system improvement project to be completed in 2016. One underground cable remediation project planned for 2016. A system project has been identified for 2017 funding consideration.
Skykomish-25	King	31	1,663,350	Not on 2014 Top 50 List		One tripsaver project planned for 2016.
Fragaria-15	Kitsap	32	1,520,073	Not on 2014 Top 50 List		A system project has been identified for 2017 funding consideration.

Circuit	County	2015 Year End 5 Year Avg Rank	2015 Year End Average Total CMI	2014 Year End 5 Year Avg Rank	2014 Year End Average Total CMI	Action by PSE
Miller Bay-17	Kitsap	33	2,168,073	37	1,832,668	Installed recloser in 2010. Reconductor project completed in 2011. Construction of new feeder tie to begin in 2016. Tree wire underbuild to be done with transmission project in 2016.
Poulsbo-15	Kitsap	34	1,734,125	44	995,851	Reconductor of overhead line to tree wire project planned to begin in 2016.
Inglewood-15	King	35	1,449,348	Not on 2014 Top 50 List		One Distribution Automation project planned for 2016.
Greenwater-16	King	36	2,677,416	Not on 2014 Top 50 List		Rebuilt substation 2010. Phase one of a multi-phase pole relocation projects starting in 2016. A system project has been identified for 2017 funding consideration.
Fragaria-16	Kitsap	37	1,645,560	40	1,025,838	Completed reconductor of portions of overhead line to tree wire in 2014 and 2015. One underground cable remediation project planned for 2016.
Fernwood-17	Kitsap	38	1,078,159	39	918,903	Completed reconductor of portions of overhead line to tree wire in 2009 and 2014. Installed recloser and completed a system project in 2015.
Avondale-15	King	39	1,148,355	Not on 2014 Top 50 List		Planning is currently reviewing system reliability projects for future construction.
Blumaer-17	Thurston	40	1,713,497	23	1,852,563	Reconfigured the circuit and installed tree wire tin 2012. Completed underground cable remediation project in 2014. Another underground cable remediation project planned for 2016.

Circuit	County	2015 Year End 5 Year Avg Rank	2015 Year End Average Total CMI	2014 Year End 5 Year Avg Rank	2014 Year End Average Total CMI	Action by PSE
Langley-16	Island	41	2,787,258	Not on 2014 Top 50 List		Feeder tie planned for 2016.
Alger-15	Skagit	42	1,137,773	Not on 2014 Top 50 List		A tripsaver project planned for 2016.
Orchard-13	King	43	2,532,164	18	2,697,948	Completed two underground cable remediation projects in 2014 and one is scheduled in 2015. Completed installation of line spacers to eliminate line slapping related outages in 2015.
Silverdale-13	Kitsap	44	876,598	36	924,896	Reconductor of overhead line to tree wire completed in 2015.
Langley-12	Island	45	2,094,876	Not on 2014 Top 50 List		Planning is currently reviewing system reliability projects for future construction.
Kendall-12	Whatcom	46	1,029,493	47	966,100	Completed reconductor of overhead line to tree wire in 2012. A system project has been identified for 2017 funding consideration.
Fall City-15	King	47	906,238	48	829,195	Installed a gang operated switch in 2011. Underground conversion project completed in 2013. An overhead system improvement project installing spacers completed in 2014.
Chambers-15	Thurston	48	1,966,358	31	2,058,622	Completed reconductor of overhead line to tree wire in 2011 and 2012. Completed feeder tie and recloser projects in 2012. One underground cable remediation project completed in 2014 and two underground cable remediation projects scheduled in 2015. One cable remediation project planned for 2016.

Circuit	County	2015 Year End 5 Year Avg Rank	2015 Year End Average Total CMI	2014 Year End 5 Year Avg Rank	2014 Year End Average Total CMI	Action by PSE
Longmire-25	Thurston	49	1,442,263	Not on 2014 Top 50 List		A system project has been identified for 2017 funding consideration.
Freeland-13	Island	50	1,611,541	Not on 2014 Top 50 List		Circuits will be reconfigured after Maxwelton Substation is completed.
Dieringer-15	Pierce	Not on 2015 Top 50 List		14	1,697,764	Underground cable replacement completed in 2013. One overhead reconductor project to tree wire completed in 2015.
Eld Inlet-25	Thurston	Not on 2015 Top 50 List		22	1,839,822	Completed a feeder project in 2010 and reconductored overhead line to tree wire with a recloser in 2011. Installed recloser in 2014. One cable remediation project was completed in 2015. Planning is currently reviewing system reliability projects for future construction.
Lake Meridian-15	King	Not on 2015 Top 50 List		30	2,245,378	City planning an underground conversion project in place of previously proposed tree wire project. One cable remediation project planned for 2016.
Patterson-15	Thurston	Not on 2015 Top 50 List		33	1,935,240	Completed reconductor of overhead line to tree wire in 2011. One underground cable remediation project completed in 2014 and one underground cable remediation project scheduled in 2015. Two underground cable remediation projects planned to start in 2016. Two system projects have been identified for 2017 funding consideration.
Lake Wilderness-14	King	Not on 2015 Top 50 List		34	1,153,088	Future plans for Jenkins substation will improve reliability. Substation construction dependent on area growth. One tree wire project completed in 2015.

Circuit	County	2015 Year End 5 Year Avg Rank	2015 Year End Average Total CMI	2014 Year End 5 Year Avg Rank	2014 Year End Average Total CMI	Action by PSE
Marine View-17	King	Not on 2015 Top 50 List		38	1,362,294	Tree trimming completed in 2015. Planning is currently reviewing system reliability projects for future construction.
Yelm-27	Thurston	Not on 2015 Top 50 List		41	1,394,158	Reconductor to tree wire completed in 2013. A system improvement project is expected to be completed in 2016.
Luhr Beach-14	Thurston	Not on 2015 Top 50 List		42	2,210,264	Completed two projects to reconductor of overhead line to tree wire in 2013. Completed two underground cable remediation projects in 2014. A system improvement project is expected to be completed in 2016.
Mckinley-17	Thurston	Not on 2015 Top 50 List		43	2,174,787	Completed two underground cable remediation projects in 2009 and 2013. Installed two gang operated switches in 2013. Overhead reconductor project and cable remediation project planned for 2016.
Lake Tapps-18	Pierce	Not on 2015 Top 50 List		45	2,186,542	Completed an overhead reconductor to tree wire project in 2013. One reconductor to tree wire project completed in 2015 and a second reconductor project to tree wire and a system improvement project construction began in 2015 to be finished in 2016. Two underground cable replacement projects planned for 2016.
South Mercer-12	King	Not on 2015 Top 50 List		46	986,941	Completed underground cable remediation and underground system project in 2013. Installation of recloser and four underground cable remediation projects planned for 2016.

Circuit	County	2015 Year End 5 Year Avg Rank	2015 Year End Average Total CMI	2014 Year End 5 Year Avg Rank	2014 Year End Average Total CMI	Action by PSE
Chambers-13	Thurston	Not on 2015 Top 50 List		49	1,025,432	Completed recloser projects in 2012. Two underground cable remediation projects completed in 2013 and 2014. One cable remediation project planned for 2016.
Lake Tapps-17	Pierce	Not on 2015 Top 50 List		50	1,504,529	Completed two projects to reconductor of overhead line to tree wire in 2013. A system project has been identified for 2017 funding consideration.

O Current Year Geographic Location of Electric Service Reliability Customer Complaints on Service Territory Map with Number of Next Year's Proposed Projects and Vegetation-Management Mileage

This appendix illustrates current-year geographic location of electric service reliability customer complaints on service territory map with number of next year's proposed projects and vegetation-management mileage.

Figure O1: 2015 Customer Complaints with 2016 System Projects